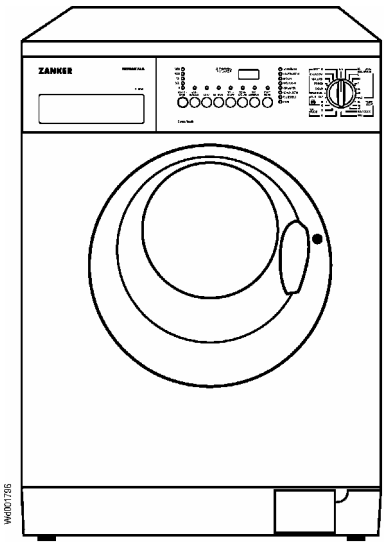
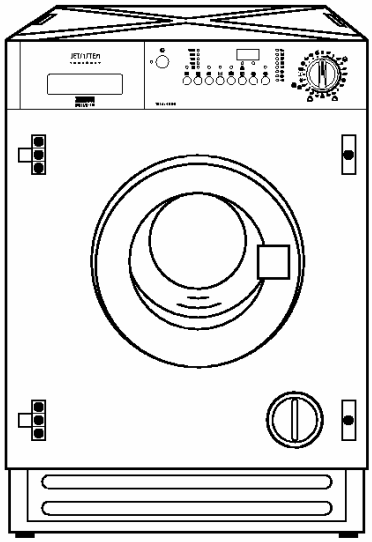
Electrolux
Distriparts

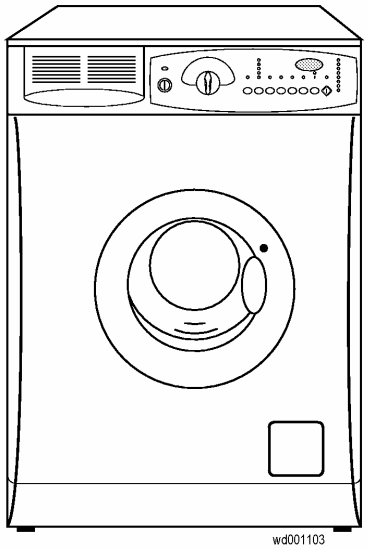
SERVICE MANUAL

WASHING

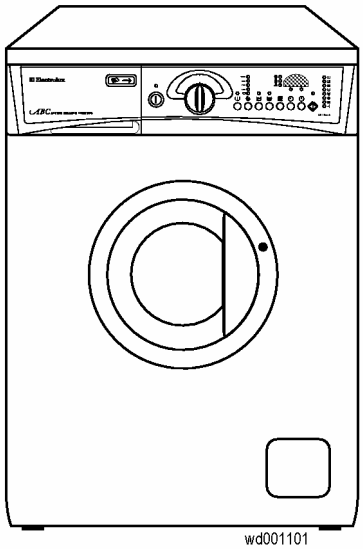




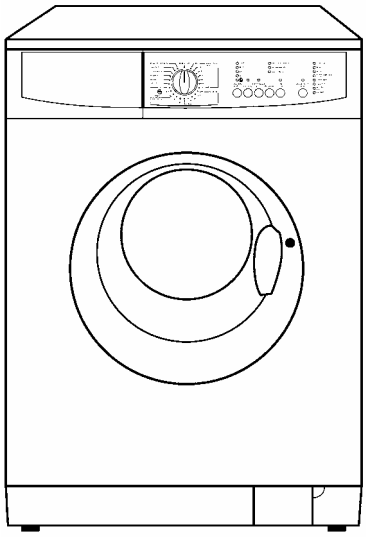
wd001326



wd001103



wd001101



© ELECTROLUX HOME PRODUCTS
ITALY S.p.A.
Spares Operations Italy
Corso Lino Zanussi, 30
I - 33080 PORCIA /PN

Fax +39 0434 394096

Publication no.

599 36 45-85

EN

Edition: 2004-05-20

Washing machines with EWM2000 EVO electronic control system CONTROL/DISPLAY board and CONTROL PANEL

Stylings: Ellipse, Alpha, NewMultipanel, Sigma e Sigma/ZK

Production ZP (Porcia-Italy)

CONTENTS

1 Purpose of this manual 5
2 PRECAUTIONS 5
3 GENERAL CHARACTERISTICS 5
4 CONTROL PANEL 6
4.1 Control/display board 7
4.1.1 Version with display 7
4.1.2 Versions without display 7
5 Washing programmes 8
5.1.1 Configuration of the programmes 8
5.2 Programme selector 8
5.3 Start/Pause 8
5.4 Functions of the buttons 8
6 WASHING PROGRAMMES AND OPTIONS 9
6.1 Programmes 9
6.2 Options of the washing cycle 10
6.3 Description of options 11
6.3.1 Night cycle 11
6.3.2 Rinse-hold 11
6.3.3 Pre-wash 11
6.3.4 Soak 11
6.3.5 Stains 11
6.3.6 Short (daily) 11
6.3.7 Very short 11
6.3.8 Intensive 11
6.3.9 Economy / Energy label 12
6.3.10 Sensitive 12
6.3.11 Extra rinse 12
6.3.12 Bleach 12
6.3.13 “Half load” button 12
6.3.14 Easy-Iron 12
6.3.15 Reduced spin speed 12
6.3.16 No spin 12
6.3.17 Modifying the spin speed 13
6.3.18 Time reduction (Quick) 13
6.3.19 Temperature adjustment 13
6.3.20 Delayed-start time 13
6.3.21 Exclude buzzer 13
6.4 Variazione dei risciacqui in funzione delle opzioni 14
6.5 Display (some models) 14
6.6 LEDs 15
7 WASHING PROGRAMMES 16
7.1 Base programmes for Cotton / Linen: cold-30-40-60-90° (without options) 16
7.2 Rinses of cotton cycles 17
7.3 Cotton / Linen Cycles: 90 Eco, 40-60 “energy label” (without options) 18
7.4 Rinses of Cotton / Linen Cycles: 90 Eco, 40-60 “energy label” (without options) 19
7.5 Synthetics Cycles: cold – 30 – 40 – 50 – 60° (without options) 20
7.6 Rinses of synthetics cycles 21
7.7 Delicates Cycles: cold – 30° - 40° (without options) 22
7.8 Wool cycles: cold – 30° - 40° 23
7.9 Hand wash: cold – 30° - 40° 24
7.10 Drum movements at low speed and during spin 25
7.10.1 D55 Delicate movement 25
7.10.2 N55 Normal movement 25
7.10.3 E55 Vigorous movement 25
7.10.4 PWL_1 (wool) Delicate movement 25
7.10.5 PWL_4 (hand wash) Delicate movement 25
7.10.6 Cotton/Linen, Synthetics – C0 Intermediate Synthetics Prewash Spin 26
7.10.7 C1 Cotton/Linen Wash Spin 26
7.10.8 C2 Cotton/Linen Intermediate Spin 26
7.10.9 COT_CF Cotton/Linen Final Spin 26
7.10.10 SYN_CF Synthetics Intermediate and Final Spin 26
7.10.11 DEL_ CF Delicates Final Spin 27

7.10.12 WOOL_CF Hand Wash and Wool Final Spin 27
7.10.13 Easy iron Impulse Cycle EI 27
7.10.14 Intermediate Spin for Cotton/Linen CSR with Super-rinse option 27
7.11 Control of water level in tub 28
8 TECHNICAL CHARACTERISTICS 29
8.1 EWM2000EVO Electronic control 29
8.1.1 Functions of the circuit board 29
8.1.2 Memory in the control system 29
8.2 Analogic pressure switch (electronic) 31
8.3 Pressure switch 32
8.3.1 Pressure switch settings 32
8.4 Anti-flooding device 33
8.5 Power supply and programme selection 33
8.6 Door interlock 34
8.6.1 Voltmetric interlock with PTC 34
8.6.2 Instantaneous door interlock 35
8.7 Detergent dispenser 36
8.8 Water fill system 36
8.9 Drain pump 37
8.10 Recirculation pump 37
8.11 Heating 38
8.11.1 Heating element 38
8.11.2 Temperature sensor 38
8.12 Motor 39
8.13 Power supply to motor 39
8.14 Anti-foam control system 39
8.15 “FUCS” (Fast Unbalance Control System) 40
9 DEMO Mode 42
9.1 Exiting demo mode 42
10 DIAGNOSTICS SYSTEM 43
10.1 Access to diagnostics system 43
10.2 Exiting diagnostics system 43
10.3 Phases of the diagnostics test 43
10.3.1 Display board diagnostics 45
10.3.2 Programme selector 46
11 ALARMS 47
11.1 Displaying the alarms to the user (for appliances with Display) 47
11.1.1 Alarms displayed during normal operation 47
11.2 Reading the alarm codes 48
11.2.1 Displaying the alarm 48
11.2.2 Examples of alarm displays 48
11.2.3 Operation of alarms during diagnostics 49
11.3 Notes about some alarms 49
11.4 Rapid reading of alarm codes 49
11.5 Cancelling the last alarm with LEDs 49
11.6 Table of alarm codes 50
12 Operating time counter 53
12.1.1 Operating time reading 53
12.1.2 Displaying the operating time 53
13 BASIC CIRCUIT DIAGRAM WITH DISPLAY 54
13.1 Key to circuit diagram 55

1 Purpose of this manual

The purpose of this manual is to provide service engineers who are already familiar with the repair procedures for traditional washing machines with information regarding appliances fitted with the EWM2000 EVO electronic control system and produced in Porcia (Italy).
The electronic control system plus EWM2000EVO consists of a main electronic board and one control/display board, “Full SMD”/LCD version.
The following are described:

- General characteristics
- Control panel and washing programmes
- Technical characteristics
- Guide to the diagnostics

For detailed information concerning hydraulic circuit, structural characteristics of the appliances and accessibility, please refer to Service Manual of washing machines and washer-dryers Series P6000/Nexus (publication no. 599 35 23-17).

2 PRECAUTIONS

- **Electrical appliances must be serviced only by qualified Service Engineers.**
- **Always remove the plug from the power socket before touching internal components.**

3 GENERAL CHARACTERISTICS

Programme selector	▪ 16 positions with incorporated main switch
Serial port	▪ DAAS-EAP communications protocol up to 38400 baud
Power supply	▪ 220/240V ▪ 50 Hz
Type of washing	▪ Jet-system
Rinsing system	▪ Jet-system
Motor	▪ Collector, with tachimetric generator
Spin speed	▪ 850 ÷ 1600 rpm
Anti-unbalancing system	▪ FUCS
Water fill	▪ 1 solenoid valve with 1 inlet – 2 or 3 outlets
Detergent drawer	▪ 3 compartments: prewash/stains, wash, conditioners ▪ 4 compartments: prewash/stains, wash, conditioners, bleach
Control of water level in the tub	▪ possibility of three-level pressure switch: 2 anti-boiling and anti-flooding safety levels ▪ electronic/analogic pressure switch
Door safety device	▪ Traditional (with PTC) ▪ Instantaneous
Power of heating element	▪ Up to 1950W
Temperature control	▪ NTC sensor

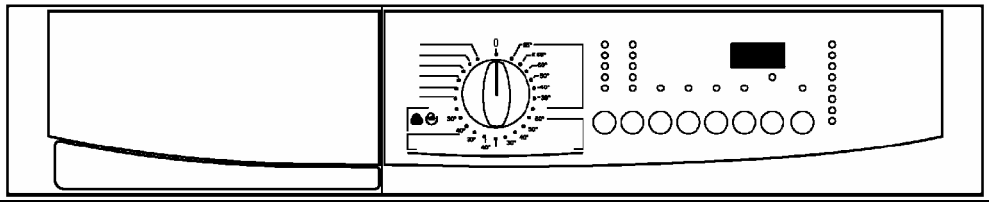
4 CONTROL PANEL

The configuration of the control panel depends on the following:

- Type of control/display board (with or without display)
- Design of the control panel and position of the programme selector (right or left of the buttons)
- Number and configuration of the buttons (max. 8)
- ON/OFF switch: incorporated in the programme selector or with separated button.

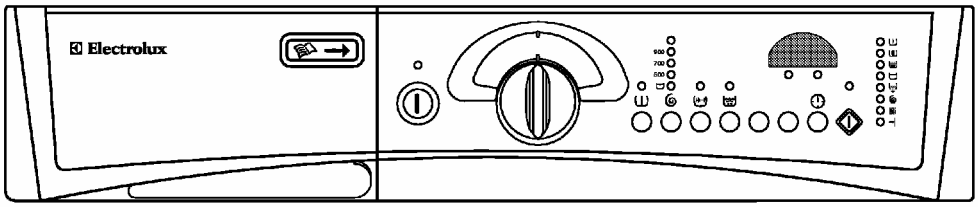
Version with left selector and incorporated ON/OFF button

Sigma

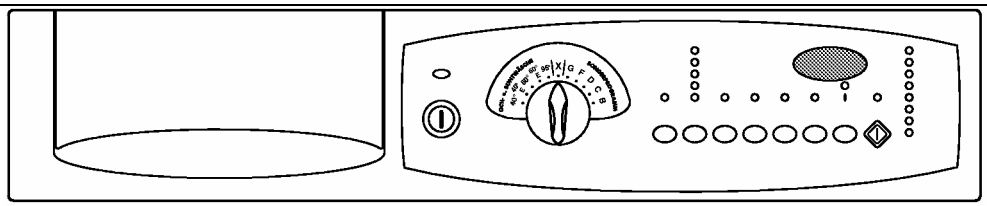


Version with left selector and button ON/OFF switch

Alpha

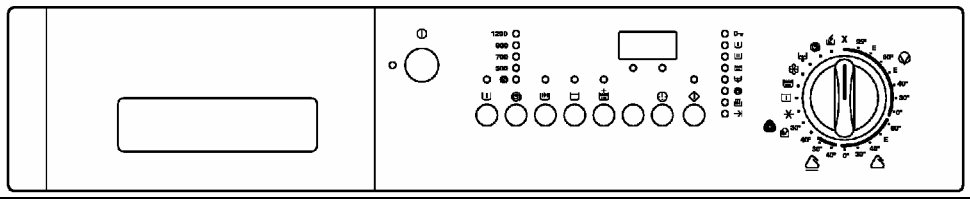


Ellipse



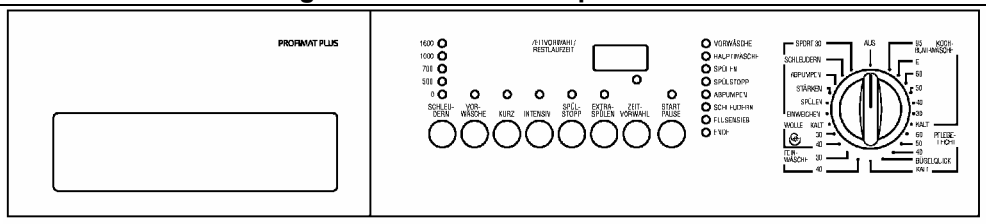
Version with right selector and button ON/OFF switch

Multipanel Built-in



Version with right selector and incorporated ON/OFF switch

Sigma/ZK



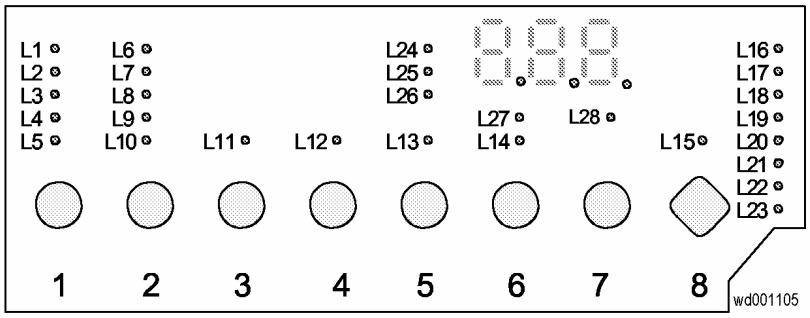
4.1 Control/display board

4.1.1 Version with display

⇨ 3 digits

⇨ 28 LEDs

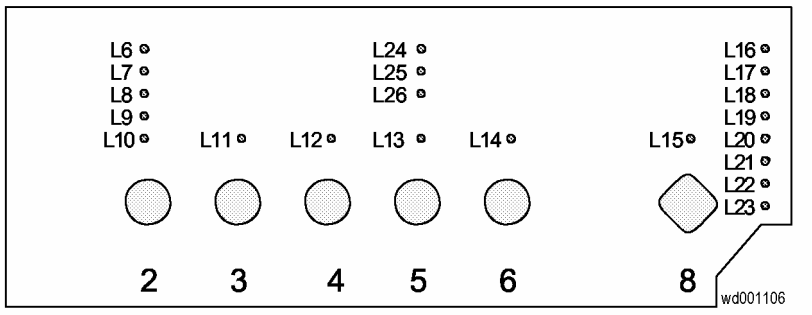
⇨ 8 buttons



4.1.2 Versions without display

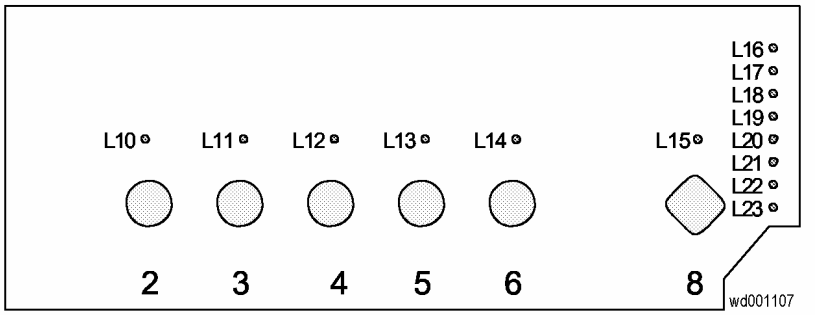
⇨ 21 LEDs

⇨ 6 buttons



⇨ 4 LEDs

⇨ 6 buttons



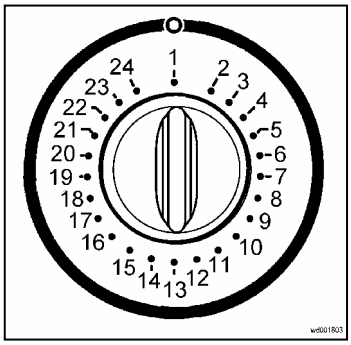
5 Washing programmes

5.1.1 Configuration of the programmes

The table below lists the parameters that can be used to define the washing programmes.

Types of fabrics	Cotton/linen, Synthetics, Delicates, Wool, Hand-wash, Mini
Special programmes	Soak, Rinses, Spin, Drain, Conditioner
Temperature	Normal, Maximum: the initial temperature is the maximum that can be selected for a specific washing programme
Spin	Normal, Minimum, Maximum
Options (Normal/Possible)	Bleach, Economy (energy label), Stains, Short, Very short, Reduced spin speed, Night-time cycle, Half-load, Easy-Iron, Rinse Hold, Extra rinse, Pre-wash, Sensitive, Intensive, No spin
Programme phases	Pre-wash, Wash, Rinses, Spin, End-of-cycle

5.2 Programme selector



The programme selector defines the type of washing cycle (ex: water level, drum movement, no of rinses) and washing temperature to be selected according to the type of wash.
The programme selector can be rotated both clockwise and anti-clockwise.

The first position is used to cancel the current programme (and to switch the appliance off, if the main switch is incorporated in the selector).

5.3 Start/Pause

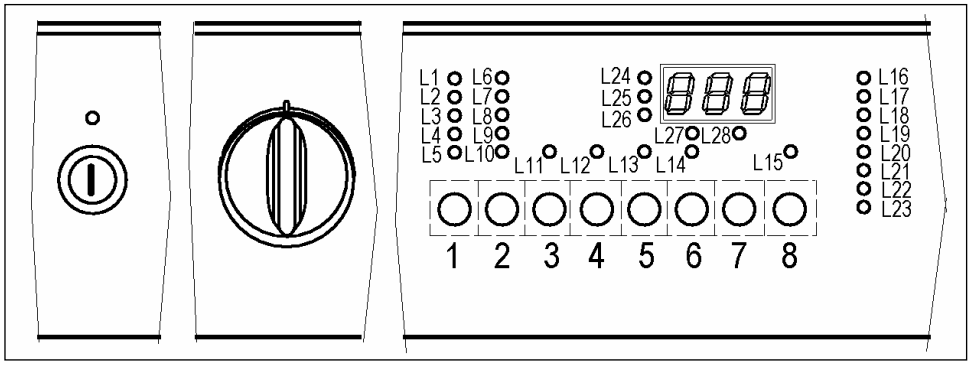
Start: after selecting the programme and the desired options, press this button to start. If the delay time ahs been selected, the countdown will begin and the display will indicate it. The LED stops flashing and remains lit for the whole duration of the programme.

Pause: by pressing the button again, the current programme is interrupted and the display, or the corresponding LED starts flashing. During the pause phase it is possible to open the door only if the machine is not during the heating phase, the water level is not high and the drum is not moving.

During the pause it is possible to modify the programme as follows:
- the OPTIONS of the cycle can be modified before the phase by which they have to be performed
- the SPIN can be modified before the final spin

To re-start the programme press the START/PAUSE button again.

5.4 Functions of the buttons



The washing programmes and the functions of the single buttons vary for the different models, since they are determined by the configuration operation of the appliance.

6 WASHING PROGRAMMES AND OPTIONS

6.1 Programmes

The washing programmes can be configured. The basic programmes are listed in the table below.

Programme		Temperature (°C)	Number of rinses	Final spin (rpm)
Cotton	**90**	85	3	450/650/850/1000/1200/ 1300/1400/1600
	90E	67	2	
	60	60	3	
	60E	50 (*)(**)	2	
	50	50	3	
	50/40E	44 (*)	2	
	40	42	3	
	30	30		
	cold	20		
Synthetic fabrics	**60**	60	3	Max. 900
	60/50E	42 (*)		
	50	50		
	40	40		
	30	30		
	cold	20		
Delicates	**40**	40	3	450/700
	30	30		
	cold	20		
Wool	**40**	40	3	Max. 1000
	30	35		
	cold	20		
Hand-wash	**40**	40	3	Max. 1000
	30	35		
	cold	20		
Soak		30/20	----	----
Rinses		----	3	Max. 1600
Delicate rinses		----	3	Max. 700
Conditioner		----	1	Max. 1600
Drain		----	----	----
Spin		----	----	Max. 1600
Delicate spin		----	----	Max. 700
Mini		30	2	Max. 1000

(*) energy label" programmes"

(**)

Programme	Group	Temperature (°C)
COTTON 60 E	G20	45÷53
	G22	47÷53

6.2 Options of the washing cycle

The selection of the options is to be carried out after switching on the appliance and setting the desired programme with the selector and before pressing the start/pause button.
When the button is pressed, the corresponding LED lights; by pressing it again the LED switches off.

Possible options according the selected programme

			OPTIONS															
			Rinse-hold	Night cycle	Pre-wash	Soak	Stains	Daily	Short	Economy	Sensitive	Extra rinse	Bleach	Half-load	Easy iron	Reduced spin speed	No spin	Rinse-hold
Compatibility with PROGRAMMES	COTTON	90°C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		60°C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		50°C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		40°C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		30°C	X	X	X	X		X	X	X		X	X	X	X	X	X	X
		Cold	X	X	X	X		X	X	X		X	X	X	X	X	X	X
	SYNTHETIC FABRICS	60°C	X	X	X	X	X		X	X	X	X	X			X	X	X
		50°C	X	X	X	X	X		X	X	X	X	X			X	X	X
		40°C	X	X	X	X	X		X	X	X	X	X			X	X	X
		30°C	X	X	X	X			X	X		X	X			X	X	X
		Cold	X	X	X	X			X	X		X	X			X	X	X
	MINI PROGRAMME	30°C	X	X													X	X
	DELICATES	40°C	X	X	X	X				X			X				X	X
		30°C	X	X	X	X				X			X				X	X
		Cold	X	X	X	X				X			X				X	X
	SILK	30°C	X	X									X				X	X
	WOOL – HAND-WASH	40°C	X	X													X	X
		30°C	X	X													X	X
		Cold	X	X													X	X
	SOAK																	
	RINSES		X	X								X	X	X		X	X	X
	CONDITIONER		X	X												X	X	X
	DRAIN																	
	SPIN																X	
Compatibility with OPTIONS	RINSE HOLD		■		X	X	X	X	X	X	X	X	X	X	X	X	X	X
	NIGHT CYCLE			■	X	X	X	X	X	X	X	X	X	X	X	X		
	PRE-WASH		X	X	■			X	X	X	X	X	X		X	X	X	X
	SOAK		X	X		■		X	X	X	X	X	X		X	X	X	X
	STAINS		X	X			■	X	X	X	X	X	X		X	X	X	X
	INTENSIVE		X	X	X	X	X	■				X	X	X	X	X	X	X
	DAILY		X	X	X	X	X		■			X	X	X	X	X	X	X
	SHORT		X	X	X	X	X			■		X	X	X	X	X	X	X
	ECONOMY		X	X	X	X	X				■	X	X	X	X	X	X	X
	SENSITIVE		X	X	X	X	X	X	X	X	X	■	X	X	X	X	X	X
	EXTRA RINSE		X	X	X	X	X	X	X	X	X	X	■	X	X	X	X	X
	BLEACH		X	X				X	X	X	X	X	X	■	X	X	X	X
	HALF LOAD		X	X	X	X	X	X	X	X	X	X	X	X	■	X	X	X
	EASY IRON		X	X	X	X	X	X	X	X	X		X	X	X	■	X	X
	REDUCED SPIN SPEED		X		X	X	X	X	X	X	X	X	X	X	X	X	■	
	NO SPIN		X		X	X	X	X	X	X	X	X	X	X	X	X		■
Phases in which selection is possible	PRE-SELECTION		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	PRE-WASH		X	X			X	X	X	X	X	X	X	X	X	X	X	X
	WASH		X	X			X	X	X	X	X	X	X	X	X	X	X	X
	RINSES		X														X	X
	SPIN																X	X

6.3 Description of options

6.3.1 Night cycle

- Eliminates all spin phases and adds **three** rinses in COTTON cycles and **one** rinse in SYNTHETICS cycles.
- Stops the appliance with water in the tub before the final rinse.
- Switches off the buzzer (if configured)
- To drain the water select a drain or spin cycle.

6.3.2 Rinse-hold

- Stops the appliance with water in the tub before the final spin cycle.
- To drain the water select a drain or spin cycle.

6.3.3 Pre-wash

- Adds a pre-wash phase at the start of the cycle with water heating to 30°C (or cold, if selected).
- In COTTON and SYNTHETICS cycles, performs a short spin before passing to the washing phase.
- This option cannot be selected for WOOL and HAND-WASH cycles.

6.3.4 Soak

- Adds a pre-wash phase (30' duration with wool cycle movement) at the start of the cycle with water heating at 30°C (or cold, if selected).
- In COTTON and SYNTHETICS cycles, performs a short spin (impulse) before passing to the washing phase.
- Together with the delayed start option it is possible to select a soak time from 30 minutes up to 10 hours.
- This option cannot be selected for WOOL and HAND-WASH cycles.

6.3.5 Stains

- Adds a 5-minute motor movement phase after heating to 40°C.
- Ducts water to the pre-wash/stains compartment in order to introduce the special stain-removal product.
- This option cannot be selected for DELICATES, WOOL and HAND-WASH cycles.
- The movements during the washing phase change from vigorous to normal.

6.3.6 Short (daily)

- Modifies the structure of the washes in the COTTON and SYNTHETICS programmes in order to obtain good washing performance with a very short cycle (optimization for small loads).

6.3.7 Very short

- Modifies the structure of the COTTON, SYNTHETICS and DELICATES programmes in order to obtain short washing times (optimization for small or lightly-soiled loads).
- Reduces the number of rinse cycles (one less).
- Increases the water level in the remaining two rinse cycles.

6.3.8 Intensive

- It changes the washing phase adding 10 min of normal movement in the cotton programme.

6.3.9 Economy / Energy label

- Modifies the structure of the COTTON 40°/50°/60°/90° - SYNTHETIC FABRICS 50°/60° programmes in order to reduce energy consumption.
- Reduces the washing temperature in 90°/60°/50° programmes, while for the 40° programme the temperature is increased by 4°.
- Increases the duration of the wash phase.

6.3.10 Sensitive

- Adds a rinse in the COTTON – SYNTHETIC FABRICS.
- During the cotton cycles the movements pass from vigorous to normal.
- Eliminates the intermediate spins except from the last two which are reduced.

6.3.11 Extra rinse

- Adds two rinses in the COTTON, SYNTHETICS and DELICATES cycles.
- Eliminates the intermediate spin cycles, with the exception of the last two rinses, which is reduced to 450 rpm.

6.3.12 Bleach

- Ducts water through the bleach compartment at the beginning of the first rinse in COTTON cycles.
- Pre-wash possible only where there are three solenoids.
- In models with two solenoids the bleach is not compatible with the pre-wash option.

6.3.13 "Half load" button

- Eliminates a rinse in the COTTONS programmes.

6.3.14 Easy-Iron

- **In COTTON programmes:**
- Adds three rinses.
- Eliminates the intermediate spins.
- Performs an impulse spin phase.
- Adds an "untangling" phase after the spin cycle.
- **In SYNTHETICS cycles:**
- Reduces the heating temperature in 50/60° cycles to 40°C.
- Increases the washing time.
- Prolongs the cooling phase at the end of the washing phase.
- Adds one rinse without spin cycle.
- Adds an "untangling" phase after the impulse spin cycle.

6.3.15 Reduced spin speed

- Reduces the speed of **all** spins as shown in the table

Maximum spin speed (rpm)	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Reduction for COTTON (rpm)	450	450	450	450	500	550	600	650	700	750	800
Reduction for ALL OTHER CYCLES (rpm)	450	450	450	450	450	450	450	450	450	450	450

6.3.16 No spin

- Eliminates **all** the spin phases.
- If selected, three rinses are added in the COTTON cycle and one in the SYNTHETICS cycle.

6.3.17 Modifying the spin speed

- Reduces the speed of **all** spin cycles.
- The last position can be used for NO SPIN, RINSE-HOLD.
- If the NO-SPIN option is selected, three rinses are added in the COTTON cycle, and one in the SYNTHETICS cycle.

6.3.18 Time reduction (Quick)

- Modifies the structure of the COTTON - SYNTHETICS– DELICATES programmes to obtain washing time very short (optimization for small or lightly-soiled loads).
- Reduces the no. of rinses (one rinse less).
- Increases the water level of the other two rinses.
- Corresponds to the SHORT- VERY SHORT cycles on the basis of the configuration of the appliance.

6.3.19 Temperature adjustment

- Used to select the washing temperature compatibly with the limit temperature for the cycle.
- Can be used during the cycle selection phase: the temperature can be modified only if the heating phase has not started (in pause mode).

6.3.20 Delayed-start time

- **Models with digit**

- It is possible to select, during the programme selection phase, a delayed start from 30 minutes up to 23 hours (☞ 30'☞ 60'☞ 90'☞ 2h☞ 3h...☞ 23h☞ 0h).
- During the delay phase, the time decreases every hour up to 2h, then by 30minutes.
- To start the cycle immediately, after the delay time began: press the Start/Pause button, cancel the delay time by pressing the relative button and press Start/Pause again.

- **Models with led**

- Insert a pause before the start of the programme, the delay time is indicated by the corresponding LEDs.
- To start the cycle immediately, after the delay time began: press the Start/Pause button, cancel the delay time by pressing the relative button and press Start/Pause again.

6.3.21 Exclude buzzer

- The buzzer can be deactivated by pressing a combination of two buttons simultaneously for 5 seconds. This option depends on the configuration; as a result, the buttons may vary according to the model.
- If the buzzer is deactivated, the appliance will emit no acoustic signal during selection or at the end of the cycle; however, the alarm signalling system remains operative.

6.4 Variazione dei risciacqui in funzione delle opzioni

			Number of rinses for the options				
			Normal	Sensitive	Super rinse	Night cycle Easy-iron No spin	Night cycle Easy-iron No spin Super rinse
PROGRAMMES	COTTON	Very short	2	3	4	5	6
		Short	3	4	5	6	7
		Eco	3	4	5	6	7
		Eco	2	3	4	5	6
		Normal	3	4	5	6	7
	SYNTHETIC FABRICS	Very short	2	3	3	3	5
		Eco	3	4	4	4	5
		Normal	3	4	4	4	5
	DELICATES	Very short	2	-	3	-	-
		Normal	3	-	4	-	-
	WOOL	Normal	3	-	-	-	-
	HAND-WASH	Normal	3	-	-	-	-
	SILK	Normal	3	4	5	4	5

N.B.: The option HALF LOAD, reduces of one rinse all the programmes COTTON, except for the programme VERY SHORT.

6.5 Display (some models)

The display shows the following information:

- ⇨ **three flashing digits**, when the appliance is switched on.
- ⇨ **the duration of the washing programme**, which appears after selecting it. This time corresponds to that which is necessary for the maximum load for every type of programme. After starting the programme, the time diminishes (and updates) by every minute.
- ⇨ **the end of the programme** indicated by a **"0"** (when it is possible to open the door).
- ⇨ **the delayed start**, selected by the relative button. After pressing the START/PAUSE button, the countdown starts and the delayed time diminishes by every hour. In the last 2 hours diminishes by 30min.

an alarm code, indicating anomalies in the functioning of the machine

6.6 LEDs

The LEDs indicate different information according to the type of configuration; the End-of-cycle Led is featured in all models.

Type of Led	Functions
Pre-wash	Lights during selection mode if the programme includes the pre-wash phase, and during the execution of the pre-wash.
Wash	Lights during selection mode if the programme includes the wash phase, and during the execution of the wash.
Pre-wash/Wash	Lights during selection mode if the programme includes the pre-wash or wash phases, and during the execution of these phases.
Rinse	Lights during selection mode if the programme includes rinse phases, and during the execution of the rinse.
Spin	Lights during selection mode if the programme includes the spin phase, and during the execution of the spin.
Drain	Lights during selection mode if the programme includes the drain phase, and during the execution of the drain
Extra rinse	Lights when this option has been memorized (if included in the cycle) during the execution of the rinse.
Rinse hold	Lights if the programme includes the rinse-hold option and at the end of the cycle, when the appliance stops with water in the tub.
Current cycle	Lights during execution of the cycle
End of cycle	Lights when the programme has been completed; also used to display alarm conditions
Blocked filter	Lights at the end of the cycle if the drain filter is blocked.
Overdosing	Lights at the end of the cycle if an overdosing alarm of detergent occurs.
ON/OFF	Lights when the appliance is switched on
Door	⇩ Lights when the door is locked by the interlock. ⇩ Switches off when the door is locked. ⇩ Flashes when the door is about to unlock (it is clear above all in models with safety device with PTC)
Door locked	Lights when the display shows the time-to-end

7 WASHING PROGRAMMES

7.1 Base programmes for Cotton / Linen: cold-30-40-60-90° (without options)

N.°	Phase	Description		Drain pump	Recirc. pump	Deterg Dispens.	Motor Movement			CYCLE				
							Rpm	Mov.	Pause.	90°	60°	40°	30°	*
1		Calibration	Level	ON	OFF			No mov.		DRAIN				
2		Water softener fill	Level	OFF	OFF	PW		No mov.		WATER FILL				
3		Water softener maintenance	Time	OFF	OFF	PW	55	4	12	1 min.				
4	Prewash	Water fill	Level	OFF	OFF	PW		No mov.		COT_FIRST_PW_LEV				
5		Maintenance & refill	Time	OFF	ON	PW	55	4	12	4 min.				
6		Heating	Temperature	OFF	ON	PW	55	4	12	COT_FIRST_PW_LEV Heating up to 30°				20
7		Maintenance	Time	OFF	ON	PW	55	4	12	4 min.				
8		Drain	Time	ON	OFF			No mov.		Empty Elect. + 14 Sec.				
9		Spin	Time	ON	OFF			IMP C0		4,5 min.				
10		Calibration	Level	ON	OFF			No mov.		DRAIN				
11		Water softener fill	Level	OFF	OFF	PW		No mov.		WATER FILL				
12		Water softener maintenance	Time	OFF	OFF	PW	55	4	12	1 min.				
13		Water fill	Level	OFF	OFF	W		No mov.		COT_FIRST_PW_LEV				
14		Maintenance & refill	Time	OFF	ON	W	40	10	3	5 min. COT_SECOND_NW_LEV				
15		Heating	Temperature	OFF	ON	W	55	8	8	85°	60°	42°	30°	20°
16	Wash	Maintenance	Time	OFF	ON	W	55	10	3	T° ref 2 min.	5 min.	T° ref 5 min.	T° ref 5 min.	T° ref 5 min.
17		Heating	Time	OFF	OFF	W	55	8	8	T° ref 3 min.				
18		Maintenance	Time	OFF	OFF	W	55	10	3		5 min			
19		Maintenance	Temperature	OFF	ON OFF se 90°	W	55	10	3	85°		42°	30°	20°
20		Maintenance	Temperature	OFF	OFF	W	55	10	3	15 min.	10 min.	25 min.	25 min.	25 min.
21		Cooling	Time	OFF	OFF	W	55	3	10	2 litres				
22		Maintenance	Time	OFF	ON	W	55	3	10	2 min.				
23		Drain	Time	ON	OFF			No mov.		Empty Elect. + 14 Sec.				
24		Spin	Time	ON	OFF			C1		5 min.				

The data are indicative

PW = Prewash
W = Wash

7.2 Rinses of cotton cycles

N.°	PHASE	Description		Drain pump	Recirc. pump	Deterg. Disp.	Motor Movement			CYCLE				
							Rpm	Mov.	Pause.	90	60	40	30	*
25	1st Rinse	Water fill	Level	OFF	OFF	BL		OFF		COT_FIRST_N_R_LEV				
26		Maintenance & refill	Time	OFF	ON	W	55	8	8	5 min. COT_REF_N_R_LEV				
27		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec.				
28		Spin	Time	ON	OFF			C1		5 min.				
29	2nd Rinse	Water fill	Level	OFF	OFF	W		OFF		COT_INT_N_R_LEV				
30		Maintenance & refill	Time	OFF	ON	W	55	8	8	5 min. COT_REF_N_R_LEV				
31		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec				
32		Spin	Time	ON	OFF			C1		5 min.				
33	Last rinse (softener)	Water fill	Level	OFF	OFF	SF		OFF		COT_LAST_N_R_LEV				
34		Maintenance	Time	OFF	OFF		55	8	8	30 sec.				
35		Water fill	Level	OFF	OFF	SF		OFF		Qsf (4 Litres)				
36		Maintenance & refill	Time	OFF	ON	W	55	8	8	5 min. COT_REF_N_R_LEV				
37		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec				
38		Spin	Time	ON	OFF			COT_CF		9 min.				

The data are indicative

BL = Bleach
SF = Softener
W = Wash

7.3 Cotton / Linen Cycles: 90 Eco, 40-60 “energy label” (without options)

N.°	PHASE	Description		Drain Pump	Recirc. Pump	Deterg. disp.	Motor Movement			CYCLE		
							Rpm	Mov.	Pause.	90	60	40
1	Prewash	Calibration	Level	ON	OFF			No mov.		DRAIN		
2		Water softener fill	Level	OFF	OFF	PW		No mov.		WATER FILL		
3		Water softener maintenance	Time	OFF	OFF	PW	55	4	12	1 min.		
4		Water fill	Level	OFF	OFF	PW		No mov.		COT_FIRST_PW_LEV		
5		Maintenance & refill	Time	OFF	ON	PW	55	4	12	4 min. COT_FIRST_PW_LEV		
6		Heating	Temperature	OFF	ON	PW	55	4	12	Heating up to 30°		
7		Maintenance	Time	OFF	ON	PW	55	4	12	4 min.		
8		Drain	Time	ON	OFF			No mov.		Empty Elett. + 14 sec.		
9		Spin	Time	ON	OFF			C0		4,5 min.		
10	Wash	Calibration	Level	ON	OFF			No mov.		DRAIN		
11		Water softener fill	Level	OFF	OFF	PW		No mov.		SOFT_LEV		
12		Water softener maintenance	Time	OFF	OFF	PW	55	4	12	1 min.		
13		Water fill	Level	OFF	OFF	W		No mov.		COT_FIRST_PW_LEV		
14		Maintenance & Refill	Time	OFF	OFF	W	40	10	3	5 min. COT_SEC_EW_LEV		
15		Maintenance without refill	Time	OFF	ON	W	40	10	3	1 min.		
16		Maintenance	Time	OFF	OFF	W		OFF		22 sec...		
17		Maintenance	Time	OFF	OFF	W	40	10	3	1 min. COT_SEC_EW_LEV		
18		Maintenance	Time	OFF	ON	W	40	10	3	1 min.		
19		Maintenance	Time	OFF	OFF	W		OFF		22 sec.		
20		Heating	Temperature	OFF	OFF	W	55	8	8	67°	*	44°
21		Maintenance	Time	OFF	ON	W	55	10	3	T° ref 5 min.	30 min.	T° ref 30 min
22		Heating	Time	OFF	ON	W	55	10	3	67°	50°	44°
23		Maintenance	Time	OFF	ON	W	55	10	3		10 min.	
24		Maintenance	Temperature	OFF	OFF	W	55	8	8	30 min.		
25		Maintenance	Temperature	OFF	OFF	W	55	10	3		10 min.	35 min.
26		Drain	Time	ON	OFF			No mov.		Empty Elect. + 14 sec.		
27		Spin	Time	ON	OFF			C1		5 min.		

The data are indicative

* T° variable (45°÷55°)
PW = Prewash
W = Wash

7.4 Rinses of Cotton / Linen Cycles: 90 Eco, 40-60 “energy label” (without options)

N.°	Phase	Description		Drain Pump	Recirc. pump	Deterg. disp.	Motor Movement			CYCLE		
							Rpm	Mov.	Pause.	90	60	40
28	1st Rinse	Water fill	Level	OFF	OFF	BL		OFF		COT_FIRST_N_R_LEV		
29		Maintenance & water refill	Time	OFF	ON	W	55	8	8	4 min. COT_REF_N_R_LEV		
30		Maintenance & water refill	Time	OFF	ON	W	55	8	8	4 min. COT_REF_N_R_LEV		
31		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec.		
32		Spin	Time	ON	OFF			C1		5 min.		
33	Last rinse (softener)	Water fill	Level	OFF	OFF	SF		OFF		COT_FIRST_N_R_LEV		
34		Maintenance	Time	OFF	OFF		55	8	8	30 sec.		
35		Water fill	Level	OFF	OFF	SF		OFF		Qsf (2 Litres)		
36		Maintenance & water refill	Time	OFF	ON	W	55	8	8	4 min. COT_REF_N_R_LEV		
37		Maintenance & water refill	Time	OFF	ON	W	55	8	8	4 min. COT_REF_N_R_LEV		
38		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec		
39		Spin	Time	ON	OFF			C1		5 min.		

The data are indicative
BL = Bleach
SF = Softener
W = Wash

7.5 Synthetics Cycles: cold – 30 – 40 – 50 – 60° (without options)

N.°	PHASE	Description		Drain pump	Recirc pump	Deterg. Disp.	Motor Movement			CYCLE				
							Rpm	Mov.	Pause.	60	50	40	30	*
1	PREWASH	Calibration	Level	ON	OFF			No mov.		Drain				
2		Water softener fill	Level	OFF	OFF	PW		No mov.		SOFT_LEV				
3		Water softener maintenance	Time	OFF	OFF	PW	55	4	12	1 min.				
4		Water fill	Level	OFF	OFF	PW		No mov.		COT_FIRST_PW_LEV				
5		Maintenance & refill	Time	OFF	ON	PW	55	4	12	4 min.				
6		Heating	Temperature	OFF	ON	PW	55	4	12	COT_FIRST_PW_LEV Heating up to 30°				20°
7		Maintenance	Time	OFF	ON	PW	55	4	12	4 min.				
		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec.				
8		Spin	Time	ON	OFF			IMP C0		4,5 min.				
9	WASH	Calibration	Level	ON	OFF			No mov.		Drain				
10		Water softener fill	Level	OFF	OFF	PW		No mov.		SOFT_LEV				
11		Water softener maintenance	Time	OFF	OFF	PW	55	4	15	1 min.				
12		Water fill	Level	OFF	OFF	W		No mov.		SYN_FIRST_W_LEV				
13		Maintenance & refill	Time	OFF	ON	W	55	8	8	3 min. SYN_SECOND_NW_LEV				
14		Heating	Temperature	OFF	ON	W	55	10	3	40°	40°	40°	30°	20°
15		Heating	Temperature	OFF	ON	W	55	8	8	60°	50°			
16		Maintenance	Time	OFF	ON	W	55	10	3	10 min.	10 min.	10 min.	10 min.	T° ref 10 min.
17		Heating	Time	OFF	ON	W	55	10	3	60°	50°	40°	30°	
18		Maintenance	Time	OFF	OFF	W	55	10	3	15 min.	15 min.	15 min.	15 min.	
19		Maintenance	Time	OFF	ON	W	55	10	3					15 min.
20		Cooling	Time	OFF	OFF	W	55	3	10	2 Litres				
21		Maintenance	Time	OFF	ON	W	55	3	10	2 min.				
22		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec.				

The data are indicative

PW = Prewash
W = Wash

7.6 Rinses of synthetics cycles

N.°	Phase	Description		Drain pump	Recirc. pump	Deterg. Disp.	Motor Movement			CYCLE				
							Rpm	Mov.	Pause.	90	60	40	30	*
23	1st Rinse	Water fill	Level	OFF	OFF	BL		OFF		SYN_FIRST_R_LEV				
24		Maintenance & water refill	Time	OFF	ON	W	55	10	3	SYN_REF_R_LEV				
25		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec.				
26		Drain	Time	ON	OFF		55	4	12	1 min.				
27	2nd Rinse	Water fill	Level	OFF	OFF	W		OFF		SYN_INT_R_LEV				
28		Maintenance & water refill	Time	OFF	ON	W	55	10	3	SYN_REF_R_LEV				
29		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec.				
30		Drain	Time	ON	OFF		55	4	12	1 min.+				
31		Spin	Time	ON	OFF			C0		4,5 min.				
32	Last rinse (softener)	Water fill	Level	OFF	OFF	SF		OFF		SYN_LAST_R_LEV				
33		Maintenance	Time	OFF	OFF		55	8	8	30 sec				
34		Water fill	Level	OFF	OFF	SF		OFF		Qsf (4 Litres)				
35		Maintenance & water refill	Time	OFF	ON	W	55	8	8	5 min. SYN_REF_R_LEV				
36		Drain	Time	ON	OFF			No mov.		Empty Elect.+ 14 sec.				
37		Drain	Time	ON	OFF		55	4	12	1 min.				
38		Spin	Time	ON	OFF			C1		5 min.				

The data are indicative

BL = Bleach
SF = Softener
W = Wash

7.7 Delicates Cycles: cold – 30° - 40° (without options)

N.°	PHASE	Function		Drain pump	Recirc. Pump	Deterg. disp.	Motor Movement			CYCLE		
							Rpm	Mov.	Pause.	40	30	*
1	PREWASH	Calibration	Level	ON	OFF			No mov.		Drain		
2		Water softener fill	Level	OFF	OFF	PW		No mov.		SOFT_LEV		
3		Water softener maintenance	Time	OFF	OFF	PW	55	4	12	1 min.		
4		Water fill	Level	OFF	OFF	PW		No mov.		COT_FIRST_PW_LV		
5		Maintenance & Refill	Time	OFF	ON	PW	55	4	12	4 min. COT_FIRST_PW_LV		
6		Heating	Temperature	OFF	ON	PW	55	4	12	Heating up to 30°		20°
7		Maintenance	Time	OFF	ON	PW	55	4	12	4 min.		
8		Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
9	WASH	Calibration	Level	ON	OFF			No mov.		Drain		
10		Water fill	Level	OFF	OFF	W		No mov.		SOFT_LEV		
11		Maintenance & refill	Time	OFF	OFF	W	55	4	12	1 min.		
12		Water fill	Level	OFF	OFF	W		No mov.		DEL_FIRST_W_LEV		
13		Maintenance & refill	Time	OFF	ON	W	55	4	12	1 min. DEL_SEC_W_LEV		
14		Heating	Temperature	OFF	ON	W	55	4	12	40°	30°	20°
15		Maintenance	Time	OFF	ON	W	55	4	12	T° ref 10 min	T° ref 10 min	T° ref 10 min
16		Heating	Time	OFF	ON	W	55	4	12	40°	30°	20°
17		Maintenance	Time	OFF	ON	W	55	4	12	10 min.	10 min.	10 min.
18		Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
19	Rinses – 1st Rinse	Water fill	Level	OFF	OFF	BL		OFF		DEL_FIRST_R_LEV		
20		Maintenance & refill	Time	OFF	ON	W	55	4	12	3 min. DEL_REF_R_LEV		
21		Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
22		Drain	Time	ON	OFF		55	4	12	1 min.		
23	Rinses – 2nd Rinse	Water fill	Level	OFF	OFF	W		OFF		DEL_INT_R_LEV		
24		Maintenance & refill	Time	OFF	ON	W	55	4	12	3 min. DEL_REF_R_LEV		
25		Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
26		Drain	Time	ON	OFF		55	4	12	1 min.		
27	Rinses – Laste (softener)	Water fill	Level	OFF	OFF	SF		OFF		DEL_LAST_R_LEV		
28		Maintenance	Time	OFF	OFF		55	4	12	30 sec.		
29		Water fill	Level	OFF	OFF	SF	55	4	12	Qsf (4 Litres)		
30		Maintenance & refill	Time	OFF	ON	W	55	4	12	3 min. DEL_REF_R_LEV		
31		Drain	Time	ON	OFF			No mov.		Empty + 14 S		
32		Drain	Time	ON	OFF		55	4	12	1 min.		
33		Spin	Time	ON	OFF			DF		700Rpm		

7.8 Wool cycles: cold – 30° - 40°

N.°	PHASE		Function		Drain pump	Recirc. pump	Deterg. disp.	Motor Movement			CYCLE		
								Rpm	Mov.	Pause.	40	30	*
1	WASH		Calibration	Level	ON	OFF			No mov.		Drain		
2			Water fill	Level	OFF	OFF	W		No mov.		SOFT_LEV		
3			Maintenance & refill	Time	OFF	OFF	W	35	1	40	1 min.		
4			Water fill	Level	OFF	OFF	W		No mov.		WOOL_FIRST_W_LEV		
5			Maintenance & refill	Time	OFF	ON	W	35	1	40	1 min. WOOL_SEC_W_LEV		
6			Heating	Temperature	OFF	ON	W	35	1	40	38° T° ref 15 min.	33° T° ref 15 min.	20° T° ref 15 min.
7			Maintenance	Time	OFF	ON	W	35	1	40			
8			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
9	Rinses	1st Rinse	Water fill	Level	OFF	OFF	W		OFF		WOOL_INT_R_LEV		
10			Maintenance & refill	Time	OFF	ON	W	35	1	40	3 min. WOOL_REF_R_LEV		
11			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
12			Drain	Time	ON	OFF		55	4	12	1 min.		
13		2nd Rinse	Water fill	Level	OFF	OFF	W		OFF		WOOL_INT_R_LEV		
14			Maintenance & refill	Time	OFF	ON	W	35	1	40	3 min. WOOL_REF_R_LEV		
15			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
16			Drain	Time	ON	OFF		55	4	12	1 min.		
17		Last rinse (softener)	Water fill	Level	OFF	OFF	SF		OFF		WOOL_LAST_R_LEV		
18			Maintenance	Time	OFF	OFF		35	1	40	30 sec.		
19			Water fill	Level	OFF	OFF	SF	35	1	40	Qsf (4 Litres)		
20			Maintenance & refill	Time	OFF	ON	W	35	1	40	5 min. WOOL_REF_R_LEV		
21			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
22			Spin	Time	ON	OFF			WF		1000 rpm		

The data are indicative
SF = Softener
W = Wash

7.9 Hand wash: cold – 30° - 40°

N.°	PHASE		Function		Drain Pump	Recirc. Pump	Deterg. disp.	Motor Movement			CYCLE		
								Rpm	Mov.	Pause.	40	30	*
1	WASH		Calibration	Level	ON	OFF			No mov.		Drain		
2			Water fill	Level	OFF	OFF	W		No mov.		SOFT_LEV		
3			Maintenance & refill	Time	OFF	OFF	W	35	1	57	1 min.		
4			Water fill	Level	OFF	OFF	W		No mov.		HAND_FIRST_W_LEV		
5			Maintenance & refill	Time	OFF	ON	W	35	1	57	1 min. HAND _SEC_LEV		
6			Heating	Temperature	OFF	ON	W	35	1	57	38°	33°	20°
7			Maintenance	Time	OFF	ON	W	35	1	57	T° ref 15 min.	T° ref 15 min.	T° ref 15 min.
8			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
9	Rinses	1st Rinse	Water fill	Level	OFF	OFF	W		OFF		HAND _INT_R_LEV		
10			Maintenance & refill	Time	OFF	ON	W	35	1	57	3 min. HAND _REF_R_LEV		
11			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
12			Drain	Time	ON	OFF		55	4	12	1 min.		
13		2nd Rinse	Water fill	Level	OFF	OFF	W		OFF		HAND _INT_R_LEV		
14			Maintenance & refill	Time	OFF	ON	W	35	1	57	3 min. HAND _REF_R_LEV		
15			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
16			Drain	Time	ON	OFF		55	4	12	1 min.		
17		Last rinse (softener)	Water fill	Level	OFF	OFF	SF		OFF		HAND _LAST_R_LEV		
18			Maintenance	Time	OFF	OFF		35	1	40	30 sec.		
19			Water fill	Level	OFF	OFF	SF	35	1	40	Qsf (2l)		
20			Maintenance & refill	Time	OFF	ON	W	35	1	57	5 min. HAND _REF_R_LEV		
21			Drain	Time	ON	OFF			No mov.		Empty + 14 sec.		
22			Spin	Time	ON	OFF			WF		1000 rpm		

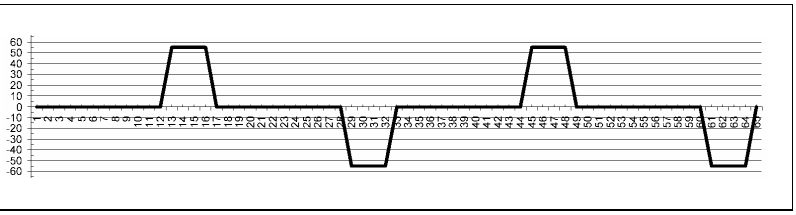
The data are indicative

SF = Softener
W = Wash

7.10 Drum movements at low speed and during spin

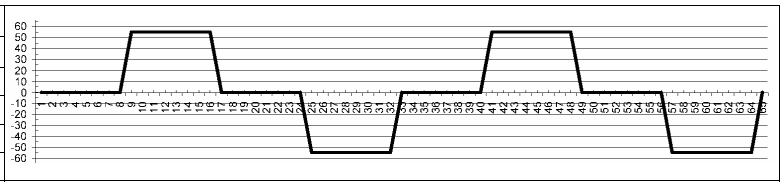
7.10.1 D55 Delicate movement

D55	
sec	**rpm**
12	0
4	55
12	0
4	-55



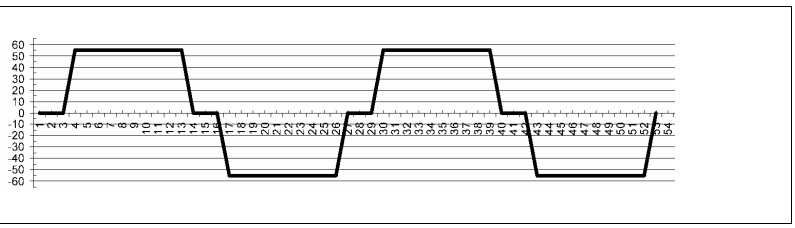
7.10.2 N55 Normal movement

N 55	
sec	**rpm**
8	0
8	55
8	0
8	-55



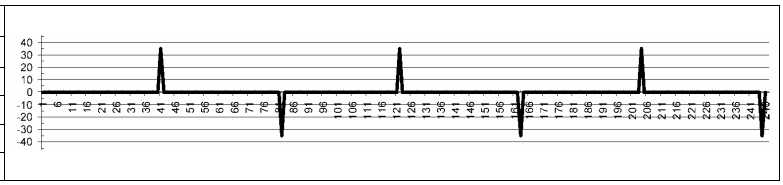
7.10.3 E55 Vigorous movement

E 55	
sec	**rpm**
3	0
10	55
3	0
10	-55



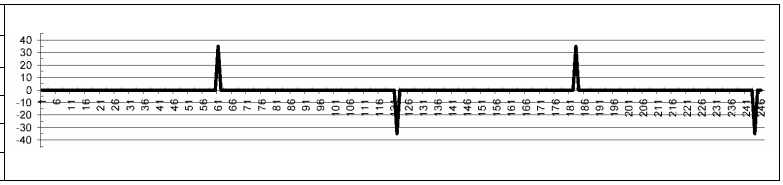
7.10.4 PWL_1 (wool) Delicate movement

PWL_1	
sec	**rpm**
40	0
1	35
40	0
1	-35



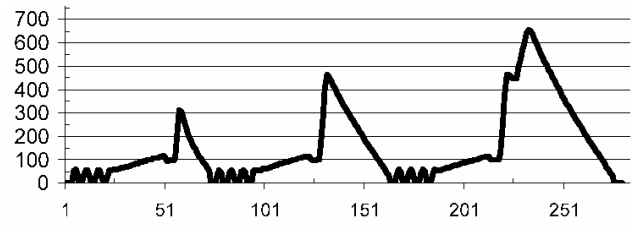
7.10.5 PWL_4 (hand wash) Delicate movement

PWL_4	
sec	**g/'**
57	0
1	35
57	0
1	-35



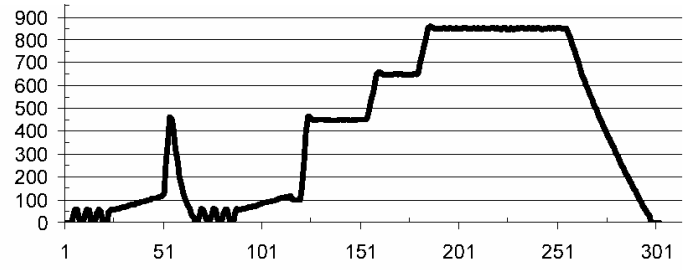
7.10.6 Cotton/Linen, Synthetics – C0 Intermediate Synthetics Prewash Spin

C0 (Prewash)		
rpm	**sec.**	**AF**
FUCS	x	no
300	0	no
FUCS	x	no
450	0	no
FUCS	x	no
450	5	no
650	0	no



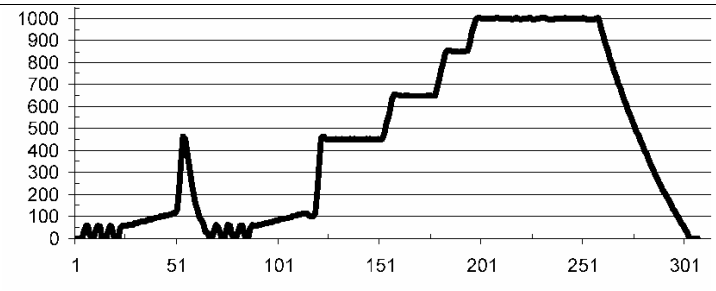
7.10.7 C1 Cotton/Linen Wash Spin

C1 (wash)		
rpm	**sec**	**AF**
FUCS	x	no
FUCS imp	x	no
FUCS	x	no
450	30	AF
650	15	AF
850	10	AF
850	60	no



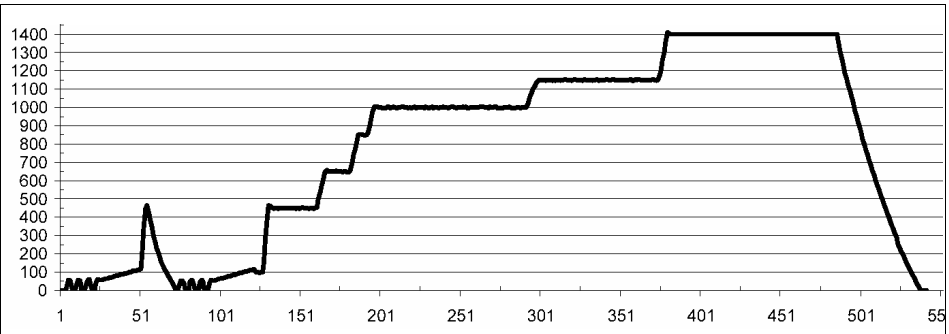
7.10.8 C2 Cotton/Linen Intermediate Spin

C2 (intermediate)		
rpm	**sec**	**AF**
FUCS	x	no
FUCS imp	x	no
FUCS	x	no
450	30	AF
650	20	AF
850	10	AF
1000	60	no



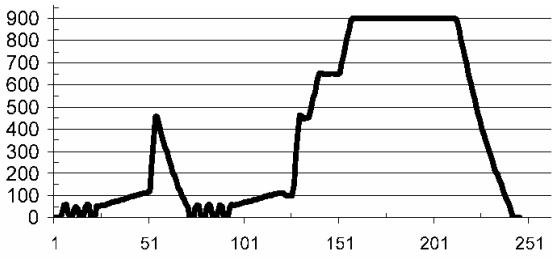
7.10.9 COT_CF Cotton/Linen Final Spin

COT_CF (cotton final)		
rpm	**sec**	**AF**
FUCS	x	no
FUCS imp	x	no
FUCS	x	no
450	30	AF
650	15	AF
850	5	AF
1000	95	no
1150	75	no
1400	110	no



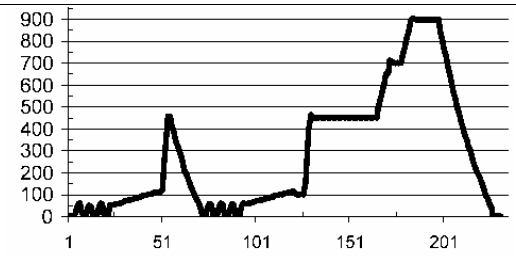
7.10.10 SYN_CF Synthetics Intermediate and Final Spin

SYN_CF (intermediate/final)		
rpm	**sec**	**AF**
FUCS	x	no
FUCS imp	x	no
FUCS	x	no
450	5	no
650	10	no
900	55	no



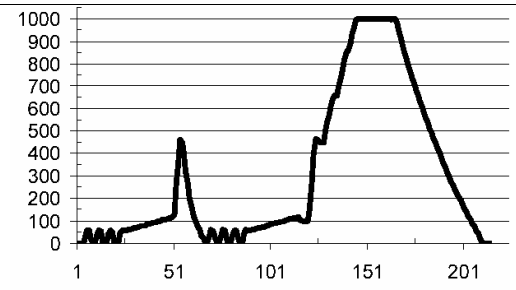
7.10.11 DEL_ CF Delicates Final Spin

CF (delicates final)		
rpm	**sec**	**AF**
FUCS	x	no
FUCS imp	x	no
FUCS	x	no
450	35	AF
700	5	AF
900	20	AF



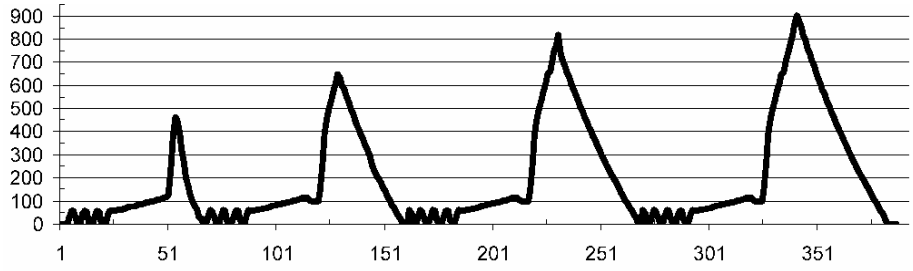
7.10.12 WOOL_CF Hand Wash and Wool Final Spin

CF (wool final)		
rpm	**sec**	**AF**
FUCS	x	no
FUCS imp	x	no
FUCS	x	no
450	5	AF
650	1	AF
850	1	AF
1000	20	no



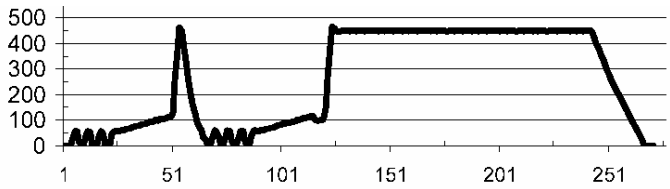
7.10.13 Easy iron Impulse Cycle EI

EASY_IRON_IMP		
rpm	**sec**	**AF**
FUCS	x	no
450	0	no
FUCS	x	no
650	0	AF
FUCS	x	no
800	0	AF
FUCS	x	no
900	0	AF



7.10.14 Intermediate Spin for Cotton/Linen CSR with Super-rinse option

CSR		
rpm	**sec**	**AF**
FUCS	x	no
FUCS imp	x	no
FUCS	x	no
450	120	AF



Notes:
AF indicates if antifoam function is active
FUCS antiunbalance function before spin phase
x variable duration

- In the diagrams the speed is indicated as rotations per minute and the time in seconds

7.11 Control of water level in tub

The water fill is carried out in three ways:
- **level fill**: is controlled by the electronic pressure switch level
- **time fill**: the duration is calculated by the electronic to fill the set quantity
- **level fill and time fill combined**

The different levels are determined by the model configuration and depend on the type of tub used.

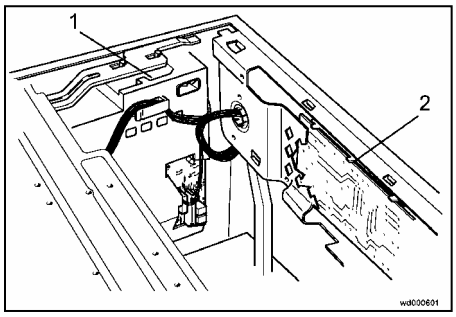
Level water fill

Type	Description of fill type	G 20		G 22	
	Levels for COTTON/LINEN	**P(*)**	**V(*)**	**P(*)**	**V(*)**
COT_FIRST_PW_LEV	Water fill first prewash level	100	65	100	65
COT_SEC_EW_LEV	Water fill second wash level for ECONOMY cycle	65	45	60	40
COT_SEC_NW_LEV	Water fill second wash level for NORMAL cycle	80	50	70	55
COT_FIRST_N_R_LEV	Water fill first rinse for NORMAL cycle	100	20	105	20
COT_INT_N_R_LEV	Water fill intermediate rinses for NORMAL cycle	105	20	100	20
COT_REF_N_R_LEV	Water fill refill for NORMAL cycle	60	20	65	20
COT_LAST_N_R_LEV	Water fill last rinse for NORMAL cycle	125	20	140	30
SOFT_LEV	Water fill	40	15	40	15
	Levels for SYNTHETICS				
SYN_FIRST_W_LEV	Water fill first level SYNTHETICS	90	20	90	20
SYN_FIRST_R_LEV	Water fill first level first rinse	160	20	150	20
SYN_SEC_NW_LEV	Water fill second level				
SYN_INT_R_LEV	Water fill first level intermediate rinses	160	20	150	20
SYN_LAST_R_LEV	Water fill first level last rinse	140	20	125	20
SYN_REF_R_LEV	Rinse level refill	60	20	60	20
	Levels for DELICATES				
DEL_FIRST_W_LEV	Water fill first level DELICATES	155	120	150	120
DEL_SEC_W_LEV	Water fill second level DELICATES	150	100	140	120
DEL_FIRST_R_LEV	Water fill first level first rinse	170	120	175	120
DEL_INT_R_LEV	Water fill first level intermediate rinses	170	120	175	120
DEL_LAST_R_LEV	Water fill first level last rinse	145	120	145	120
DEL_REF_R_LEV	Water fill rinse level refill	150	120	150	120
	Levels for HAND WASH				
HAND_FIRST_W_LEV	Water fill first level HAND WASH	140	100	125	100
HAND_SEC_W_LEV	Water fill second level HAND WASH	130	100	120	100
HAND_INT_R_LEV	Water fill first level intermediate rinses	180	100	160	100
HAND_LAST_R_LEV	Water fill first level last rinse	150	100	130	100
HAND_REF_R_LEV	Water fill rinse level refill	130	100	120	100
	Levels for WOOL				
WOOL_FIRST_W_LEV	Water fill first level	140	90	140	90
WOOL_SEC_W_LEV	Water fill second level	130	90	115	90
WOOL_INT_R_LEV	Water fill first level intermediate rinses	180	100	165	100
WOOL_LAST_R_LEV	Water fill first level last rinse	150	100	130	100
WOOL_REF_R_LEV	Water fill rinse level	120	90	120	100

(*) The measures are expressed in mm

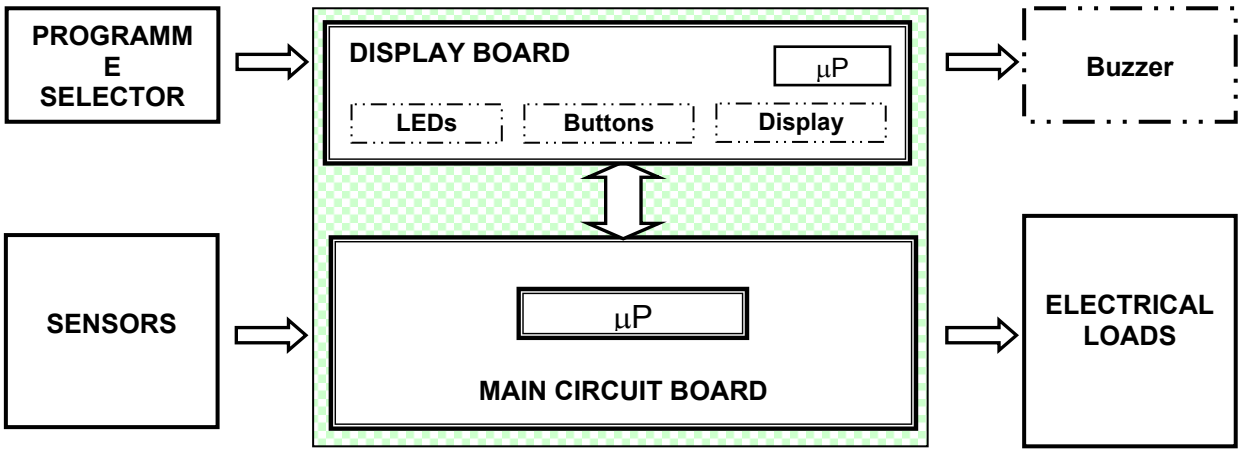
8 TECHNICAL CHARACTERISTICS

8.1 EWM2000EVO Electronic control



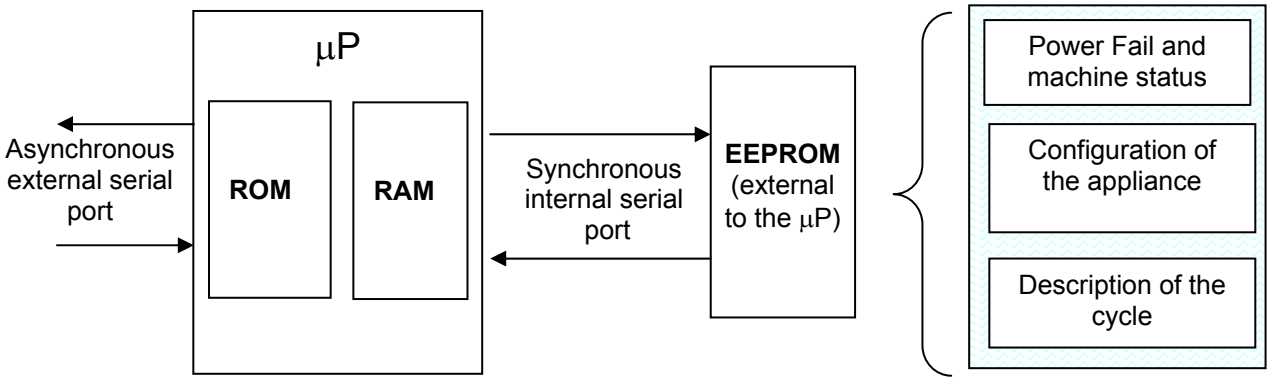
The EWM2000 EVO electronic control consists of a main PCB (1) and a control/display board (2).

8.1.1 Functions of the circuit board



- ⇨ The circuit board receives signals relative to the cycle settings via the control/display board. The buttons, the LEDs and the display are also mounted on this board which is connected to the programme selector.
- ⇨ The board also powers all the electrical components (solenoid valves, washing motor, drain pump, heating element, door interlock).
- ⇨ The board controls the temperature of the washing water via an NTC sensor, as well as the speed of rotation of the washing pump according to the signal received from the tachymetric generator.
- ⇨ It checks the water level in tub via the level pressure switch and the safety one.

8.1.2 Memory in the control system



The main circuit board features an EEPROM memory (external to the microprocessor) which stores in memory data relative to the configuration, description of the cycle, cycle status in case of a power failure, and any alarm conditions. The configuration data (entered in the factory using a computer with a DAAS interface) determine the functionalities of the appliance (number and type of programmes, options, LEDs etc).

The overall structure of the microprocessor memory on the main PCB is subdivided into three sections:

ROM This area of memory contains the software with the general instructions that control the operation of the appliance, such as those of the electrical components and alarms. The ROM is set up by the manufacturer of the microprocessor, and cannot be modified.

RAM This part of memory contains all the variables used during the execution of the wash programme, which are written in dynamic format. The RAM can be read using a DAAS interface.

EEPROM This area of memory contains:

⇒ the data necessary to restart the appliance in case of a power failure.

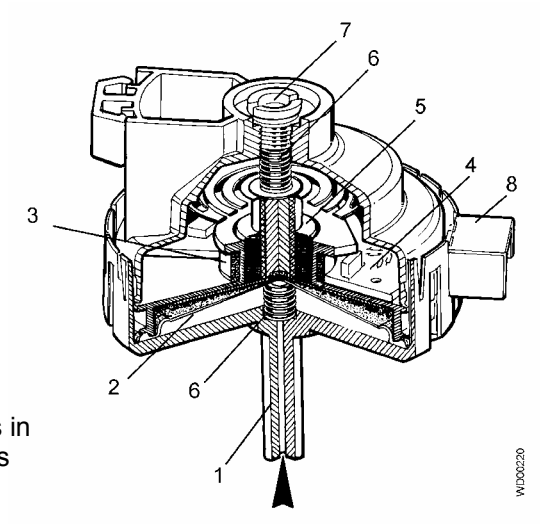
⇒ the parameters for the wash cycle, such as water fill level, speed and type of motor movement, and the temperature during the various phases of the wash cycle. Once written, this data is protected and, normally, can be read only using a DAAS interface.

⇒ data relative to the configuration of the appliance, such as the speed of the final spin phase, the volume of the tub, the type of washing system, etc. This data may be entered either via a DAAS interface or via the control/display board.

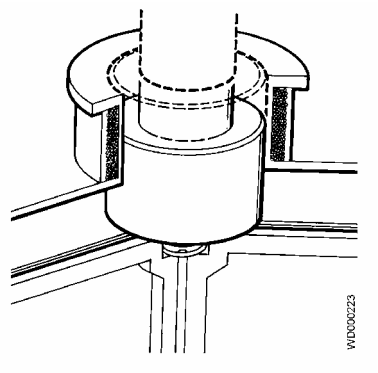
8.2 Analogic pressure switch (electronic)

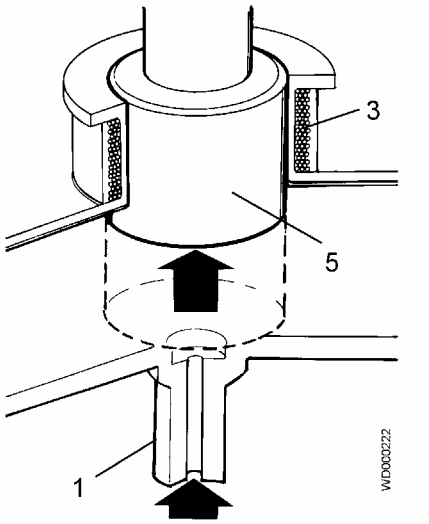
The electronic pressure switch is an analogic device that controls the water level in the tub. It is directly connected to the main electronic PCB.

1. air inlet hose
2. diaphragm
3. coil
4. electronic circuit (oscillator)
5. core
6. spring
7. calibration screw
8. connector

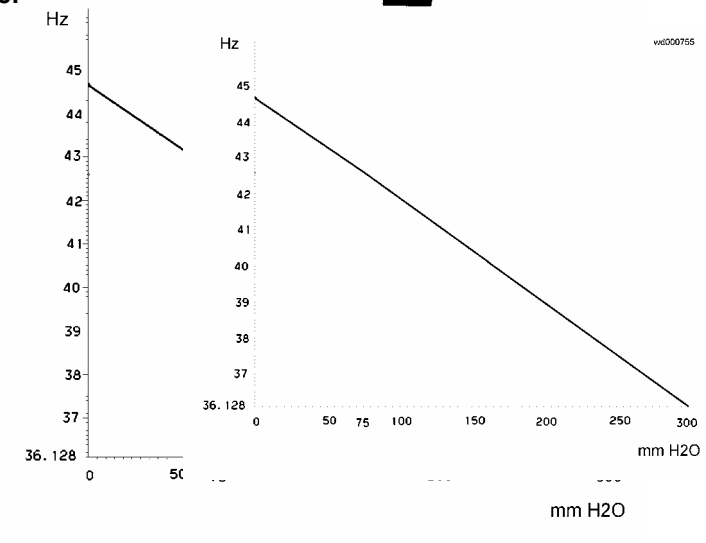


The pressure switch is connected by a hose to the pressure chamber.
When the tub is filled with water, the pressure created inside the hydraulic circuit expands the diaphragm. This in turn modifies the position of the core inside the coil, thus changing the inductance and the frequency of the oscillating circuit.
The electronic PCB, according to the frequency, recognizes the quantity of the water in the tub.





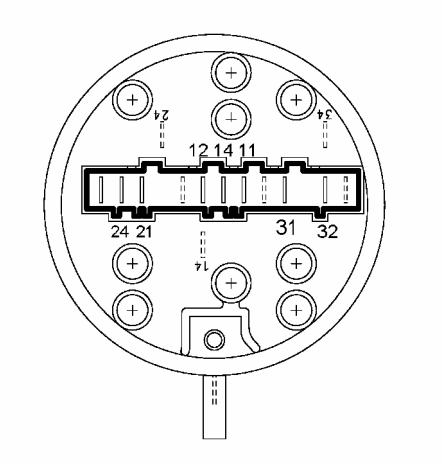
Frequency variation according to pressure.

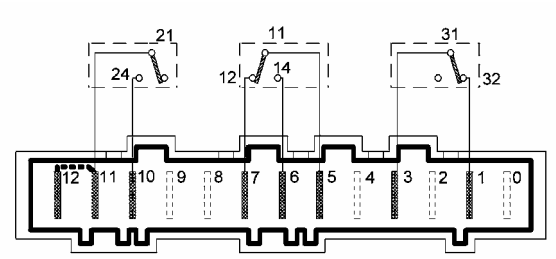


8.3 Pressure switch

Control of the water level is performed by a two or three-level pressure switch which functions as follows:

- contact **11-14**: anti-boiling safety level
- contact **21-24**: anti-boiling safety level
- contact **31-32**: anti-overflow safety level *(not all models)*





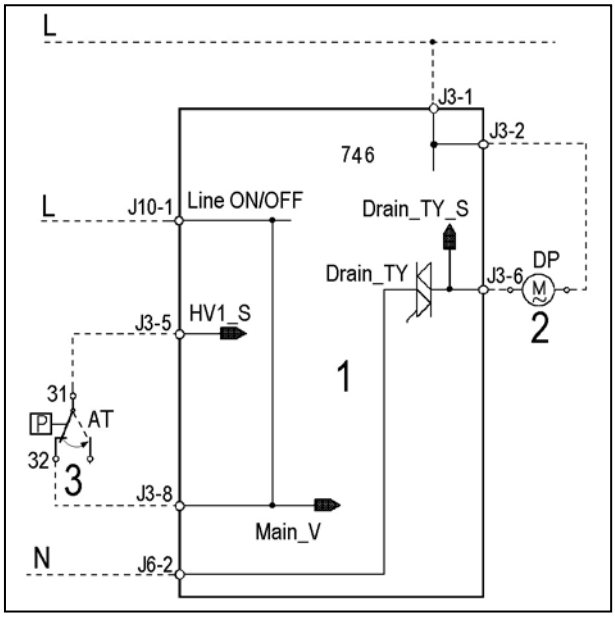
8.3.1 Pressure switch settings

	Full (mm)	**Refill (mm)**
Anti-boiling level	50± 3	30± 3
Anti-boiling level	50± 3	30± 3
Anti- overflow level	390± 15	240±50

8.4 Anti-flooding device

1. PCB
8. Drain pump
9. Anti-overflow pressure switch

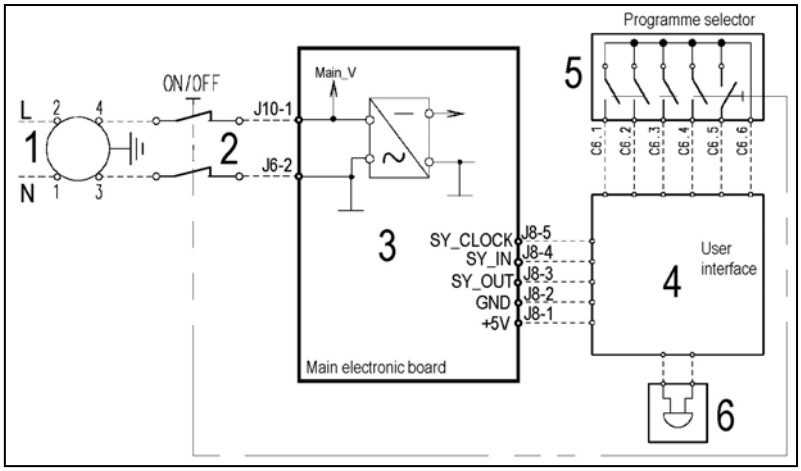
HV1_S Anti-overflow level sensor



The third pressure switch level (if featured) is used as an anti-overflow safety device: if the pressure switch contact should open in the FULL position, the PCB actions the drain pump until the pressure switch returns to the EMPTY position.

8.5 Power supply and programme selection

The main board (3) is powered by the interference suppressor (1) and by the closure of the contacts of the main switch (2). The affected connectors are J6-2 (neutral) and J10-1 (line).
The control/display board (4) is powered at 5V by the main board: through the programme selector (5) it is possible to select the programme. The selection of the options / start is performed through the board buttons (4).
The buzzer (if featured) (6) is powered by the display board.



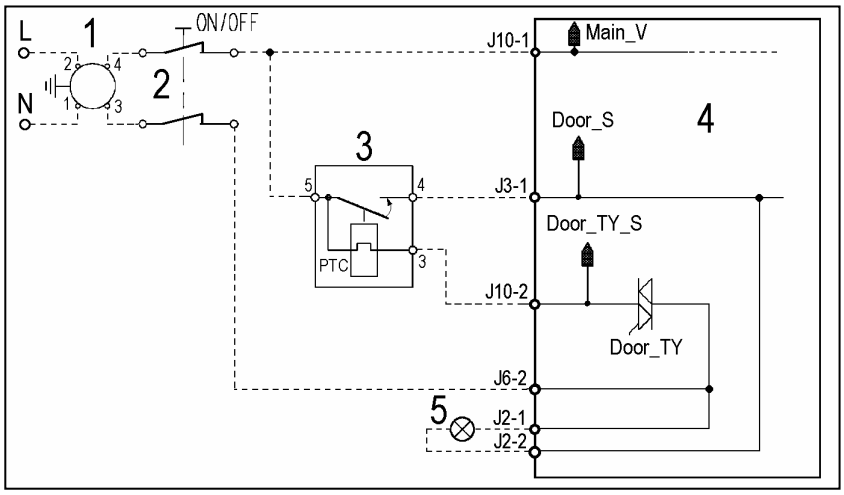
8.6 Door interlock

There are two types of door interlock:

- voltmetric with PTC: it is always necessary to wait from 1 to 3 minutes before opening the door.
- instantaneous: the door can be opened as soon as the cycle ends.

8.6.1 Voltmetric interlock with PTC

1. *Suppressor*
2. *Main switch (button or programme selector)*
3. *Door interlock*
4. *Main PCB*
5. *Door pilot lamp closed*



- **Operating principle**

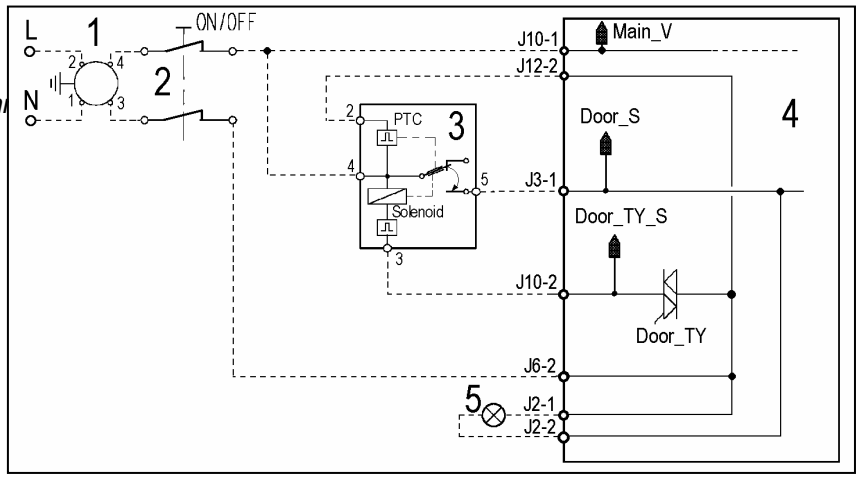
- When the washing programme is started by pressing the START/PAUSE button, the bi-metal PTC (contacts 3-5) is powered by the triac on the PCB (J10-2 connector): after 2 – 4 seconds, this closes the switch (5-4) which powers the electrical components of the appliance (only if the door is closed).
- The door interlock prevents aperture of the door while the appliance is in operation.
- At the end of the washing programme, the PCB disconnects the interlock from the power supply, but the door remains locked for 1 to 2 minutes (PTC cooling time).

Door locked" pilot lamp

- Certain models feature a pilot lamp which lights to indicate that the door is locked. This pilot lamp switches off when the door can be opened.

8.6.2 Instantaneous door interlock

1. *Suppressor*
2. *Main switch (button or program selector)*
3. *Door interlock*
4. *Main PCB*
5. *Door pilot lamp off*



- **Operating principle**

- When the appliance is switched on, the ON/OFF switch closes and the bi-metal PTC (contact 4-2) is powered; the door, however, is not locked.
- When the programme starts (START/PAUSE button), the PCB transmits a 20 msec voltage signal to contacts 4-3 of the solenoid valve (J10-2 connector of the board) (at least 6 seconds must elapse after switching on); this signal locks the door and, at the same time, closes the main switch (contacts 4-5) which powers all the components in the appliance.

- At the end of the programme, the PCB transmits two 20 msec signals (at an interval of 200 msec).
  - the first signal does not release the door.
  - the second signal (which is transmitted only if the system functions correctly) releases the door interlock and at the same time the contacts of the main switch are opened.

- **Conditions necessary for door release**

- Before transmitting the door release signals, the main PCB checks for the following conditions:
- the drum must be stationary (no signal from the tachometric generator)
- the water level must not be higher than the lower edge of the door
- the temperature of the water must not exceed 50°C.

- **Automatic release device**

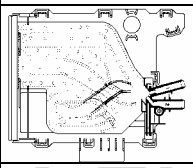
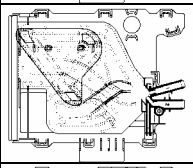
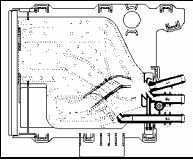
- In the event of a power failure, if the appliance is switched off, or if the solenoid should malfunction, the bi-metal PTC cools over a period of 1 to 4 minutes, and then releases the door.

- **“Door locked” pilot lamp**

- Certain models feature a pilot lamp which lights to indicate that the door is locked. This pilot lamp switches off when the door can be opened.

8.7 Detergent dispenser

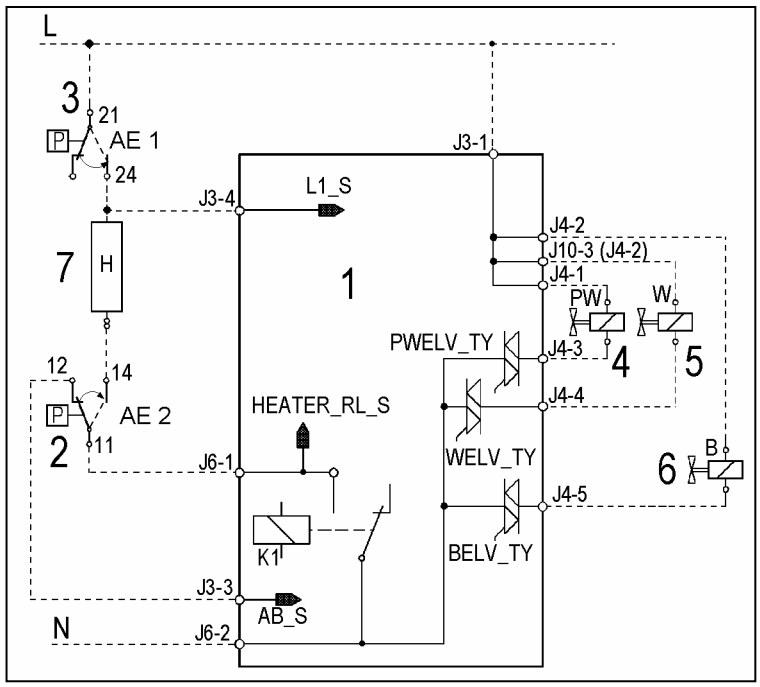
The EWM 2000 plus electronic system can control different types of dispensers:

Type	Detergent dispenser		No. of solenoid valves
3 compart-ments		Pre-wash/Stains – Wash – Conditioner *(pre-wash and stain are in alternance)*	2
4 compart-ments		Pre-wash/Stains – Wash – Bleach - Conditioner *(the pre-wash/stain and conditioner compartment are linked together with a "intersection")*	2
		Pre-wash/Stains – Wash – Bleach - Conditioner *(pre-wash and stain are in alternance)*	3

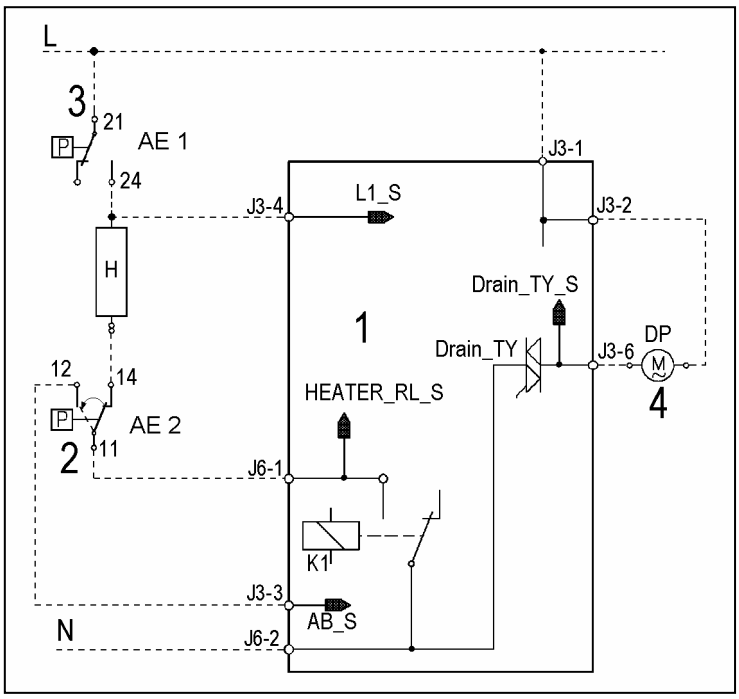
8.8 Water fill system

The solenoid valves are powered by the PCB via two or three triacs. The status of the pressure switch (empty/full) is detected by two "sensing" lines".

1. *PCB*
2. *Anti-boiling level*
3. *Anti-boiling level*
4. *Prewash solenoid*
5. *Wash solenoid*
6. *Bleach solenoid (some models)*
7. *Heating element*



8.9 Drain pump



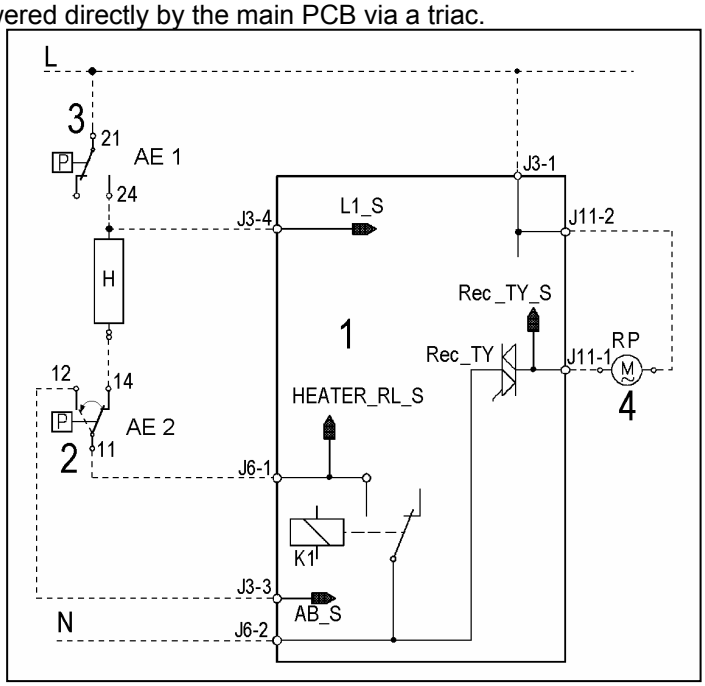
1. *PCB*
2. *Anti-boiling pressure switch AE2*
3. *Anti-boiling pressure switch AE1*
4. *Drain pump*

The PCB powers the drain pump via a triac as follows:

- for a pre-determined period.
- until the anti-boiling pressure switch closes on EMPTY, after which the pump is actioned for a brief period or passes to the subsequent phase.

8.10 Recirculation pump

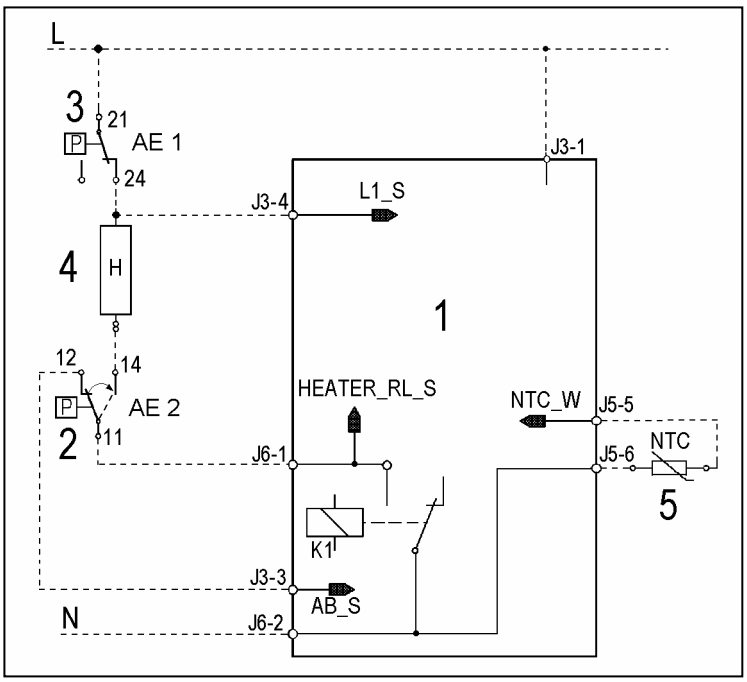
In the jetsystem models the recirculation pump is powered directly by the main PCB via a triac.



1. *PCB*
2. *Anti-boiling pressure switch AE 2*
3. *Anti-boiling pressure switch AE 1*
4. *Recirculation pump*

8.11 Heating

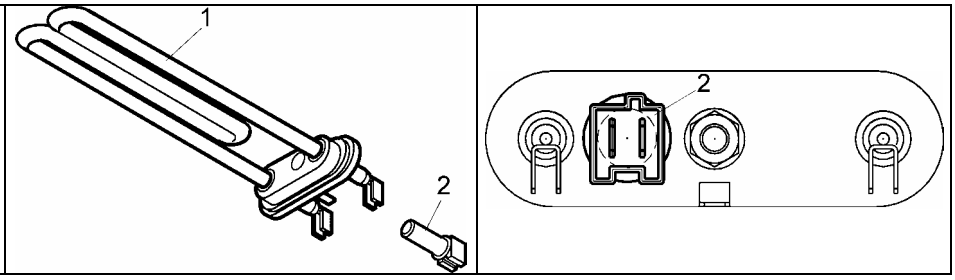
1. *PCB*
2. *Anti-boiling pressure switch AE2*
3. *Anti-boiling pressure switch AE1*
4. *Heating element*
5. *NTC temperature sensor*



The heating element is powered by a relay on the PCB via the contacts of the pressure switch when closed on FULL.

8.11.1 Heating element

1. *Heating element (1950W)*
2. *NTC sensor*



8.11.2 Temperature sensor

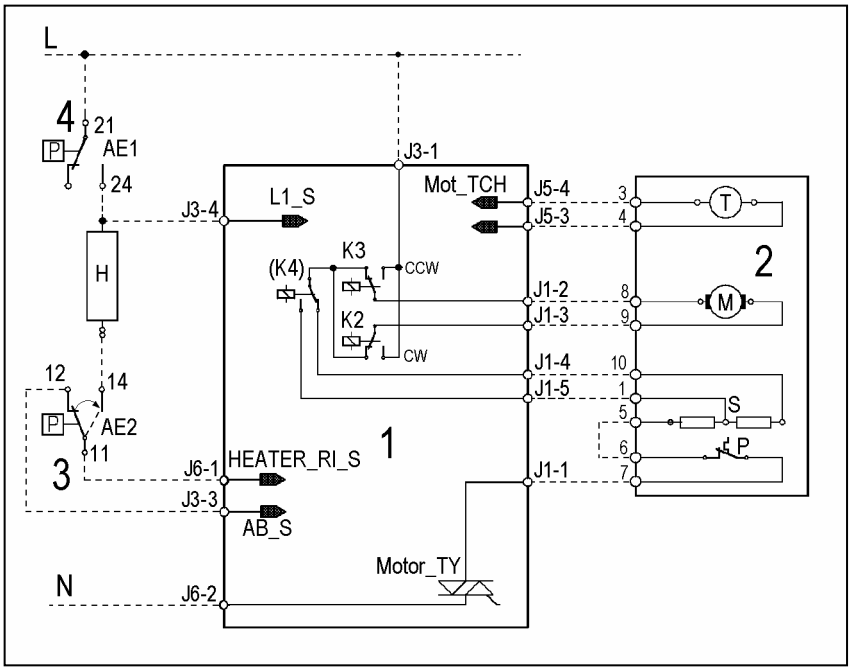
The temperature is controlled by the PCB by means of a NTC temperature sensor.

TEMPERATURE (ºC)	RESISTANCE(Ω)		
	Nominal value	Maximum value	Minimum value
20	6050	6335	5765
60	1250	1278	1222
80	640	620	660

8.12 Motor

1. *PCB*
2. *Motor*
3. *Anti-boiling pressure switch AE1*
4. *Anti-boiling pressure switch AE2*

M = rotor
P = motor safety cut-out
S = stator
T = tachometric generator



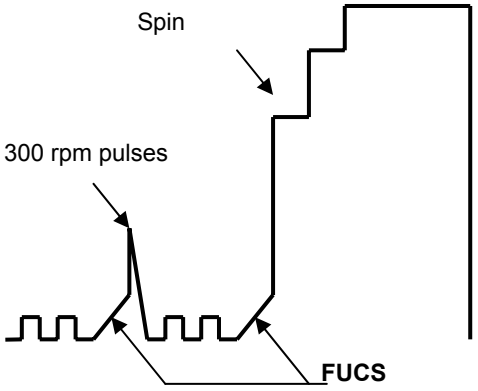
8.13 Power supply to motor

The PCB powers the motor via a triac. The direction of rotation is reversed by switching of the contacts on the two relays (K2-K3), which modify the connection between the rotor and the stator.
In certain models (1200-1600rpm), a third relay (K4) is used to power the stator (full or half field) according to the spin speed
The speed of rotation of the motor is determined by the signal received from the tachometric generator.
During the spin phases, the microprocessor, depending on the software configuration, may perform the anti-foam control procedure (if featured) and the anti-unbalancing control procedure.

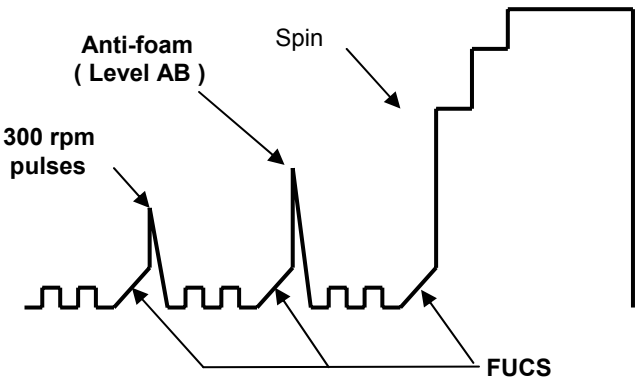
8.14 Anti-foam control system

The anti-foam control procedure (if featured) is performed via the anti-boiling pressure switch (AB).

Spin phase without foam



Spin phase with little foam

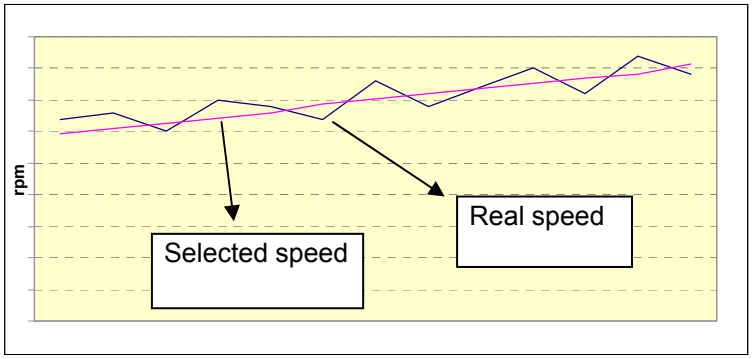


- **Spin with little foam:** if the contact of pressure switch AB closes on FULL, the spin phase is interrupted; the drain pump continues to operate and, when the contact returns to EMPTY, the spin phase is resumed.
- **Spin with excessive foam in the tub (critical situation):** The control system detects whether the pressure switch commutates 5 times to FULL. In this case, the spin phase is skipped, and a one-minute drain cycle is performed with the motor switched off; in the case of a washing phase, a supplementary rinse is added.

8.15 “FUCS” (Fast Unbalance Control System)

The control procedure for unbalanced loads is performed dynamically, before each spin cycle, as follows:

- The phase begins at a speed of 55 rpm; the speed can never fall below this threshold, otherwise the check is repeated.
- At intervals of 300 ms, the balance is calculated and compared with predetermined limits. If the value is less than the lower limit, the speed of the drum is increased by a certain value depending on the transmission relation between motor pulley/drum; if the unbalancing is higher, it is decreased by the same value. The reduction in the speed of the drum distributes the washing correctly; this procedure is repeated until the wash load is completely balanced.
- Correct balancing of the wash load is achieved at a speed of 115 rpm, after which the spin cycle begins.



The Unbalancing Control function takes place in different phases: each phase is characterized by:

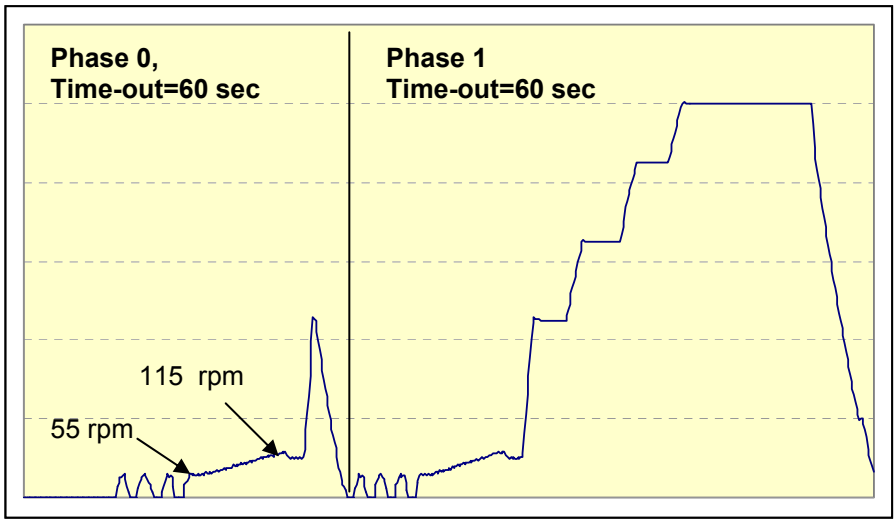
- *an unbalancing index (0-1-2-3)*
- *an unbalancing threshold value (ex: 350, 650, 850, 1200rpm)*
- *a time out (max. time)*

- **Ending of the FUCS balancing phase**

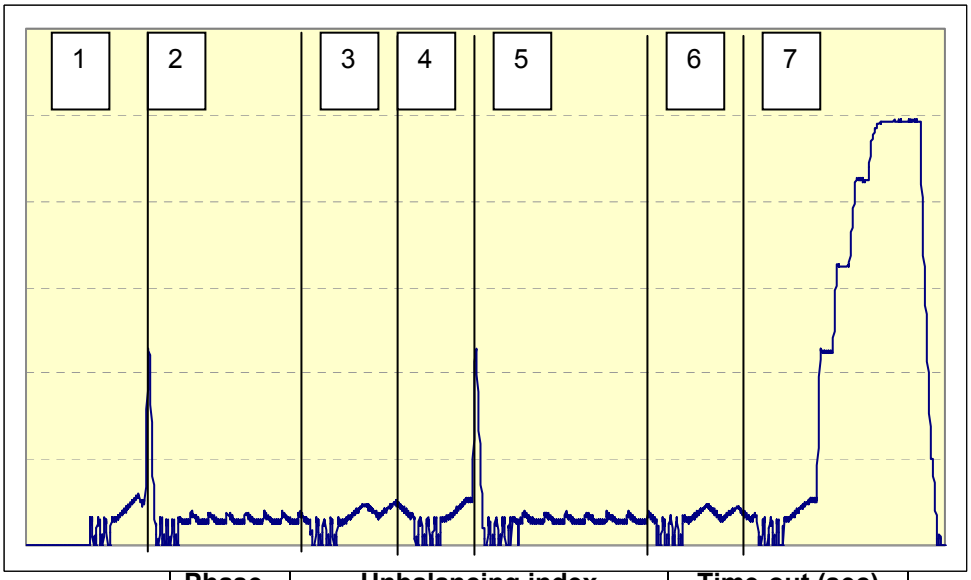
The phase is ended when:

- The drum rotation speed is 115 rpm (or 85rpm in some cases of unbalancing index). In this case the spin is performed.
- In some cases the optimal balancing value is not reached: a reduced spin is performed depending on the unbalancing.
- In the worst case, in which all phases are not sufficient to reach a minimum balancing value, the spin is not performed.

- **Example of perfect balancing**



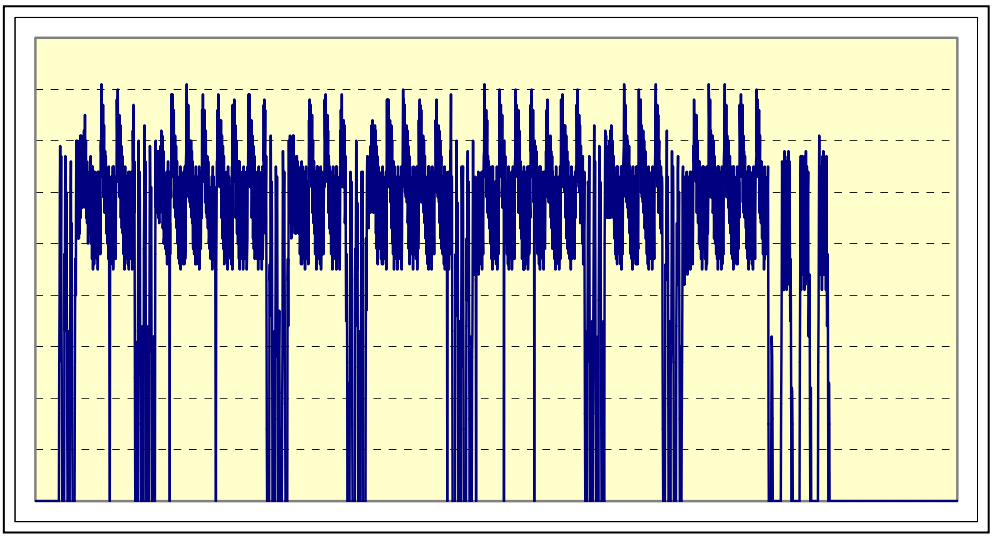
- **Balancing in the available longer interval**



Phase	Unbalancing index	Time-out (sec)
1	0	60
2	1	120
3	2	60
4	3	90
5	1	120
6	2	90
7	3	90

- **Unbalancing after all phases**

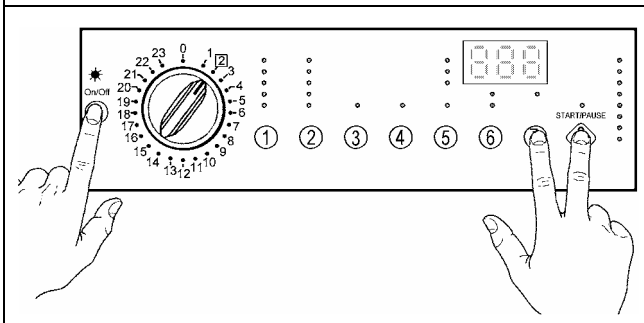
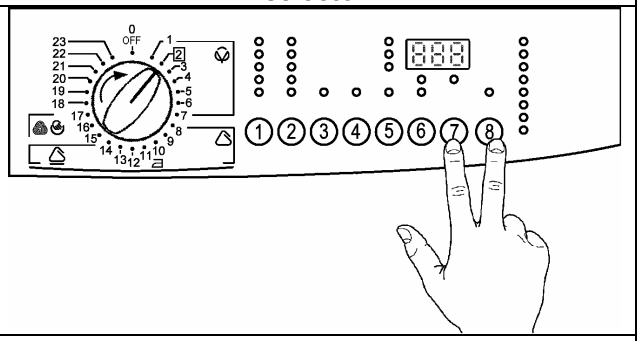
In this case the spin (or impulse) is not performed.



9 DEMO Mode

A special cycle has been created for demonstration of the operation of these appliances in retail outlets without connecting the appliance to the water supply. In this way, the salesman can select any programme; after starting the cycle by pressing START, the appliance will perform certain phases only, and will skip those which cannot be performed (water fill, drain, heating).
The cycle takes place as follows:

- the door locking device is actioned in the normal way (i.e. the door remains locked while the appliance is in operation, and can be opened at the end of the cycle or in pause mode)
- motor: all low-speed movements are enabled, while the pulse signals and the spin cycle are excluded
- the water fill solenoids and the drain pump are disabled
- display: since the phases of the cycle take place in rapid succession (1 second of the demo cycle is equivalent to 1 minute of the actual cycle), the time-to-elapse decreases by 1 unit per second. Remember that the time-to-elapse does not always correspond to the actual cycle time
- alarms: for reasons of safety, the following groups of alarms remain enabled: E40 (door closed), E50 and E90 (communication between the boards/configuration).

Version with ON/OFF button	**Version with ON/OFF button incorporated in the selector**
	
1. Cancel the set programme and switch the appliance off. 2. Rotate the programme selector of **two positions clockwise.** 3. Press the **start/pause** (8) button and any of the option button simultaneously and then, keeping them pressed, **switch the appliance on** through the ON/OFF button (on/off). 4. Hold the start/pause and option buttons down till the LEDs start flashing (about 5 seconds).	1. Cancel the set programme switching the appliance off. 2. Press the **start/pause** (8) button and any of the option button simultaneously and then, keeping them pressed, **switch the appliance on** rotating the programme selector of **two positions clockwise.** 3. Hold the start/pause and option buttons down till the LEDs start flashing (about 5 seconds).

Attention: the programme selector is not always in the position indicated in the picture; it can be on the right or on the left of the display board.

The time needed to perform a cycle in DEMO MODE depends on the programme chosen.

9.1 Exiting demo mode

- Switch the appliance off to exit the demo mode.

10 DIAGNOSTICS SYSTEM

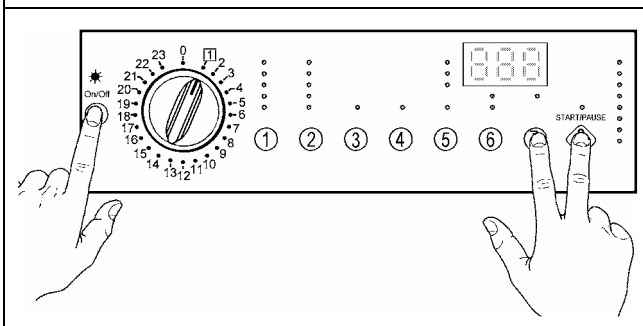
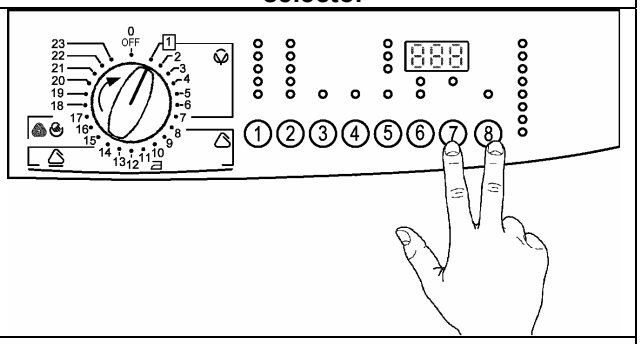
10.1 Access to diagnostics system

Using a single procedure, it is possible to access to the diagnostics system. After accessing this function, the following operations can be performed:

- control of the operation of each of the components in the appliance
- read / cancel the alarms

The diagnostics cycles are available only if the communication between the main PCB and the display board is correct; moreover there should not be configuration errors of the appliance.

To access:

Version with ON/OFF button	**Version with ON/OFF button incorporated in the selector**
	
5. Cancel the set programme and switch the appliance off. 6. Rotate the programme selector of **one positions clockwise.** 7. Press the **start/pause** (8) button and any of the option button simultaneously and then, keeping them pressed, **switch the appliance on** through the ON/OFF button (on/off). 1. Hold the start/pause and option buttons down till the LEDs start flashing (about 5 seconds).	4. Cancel the set programme switching the appliance off. 5. Press the **start/pause** (8) button and **any** of the option buttons simultaneously and then, keeping them pressed, **switch the appliance on** rotating the programme selector of **one position clockwise.** 1. Hold the start/pause and option buttons down till the LEDs start flashing (about 5 seconds).

Attention: the programme selector is not always in the position indicated in the picture; it can be on the right or on the left of the display board!

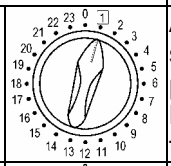
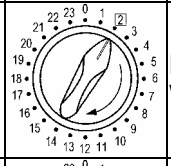
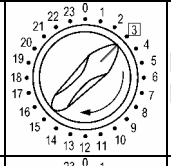
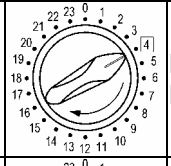
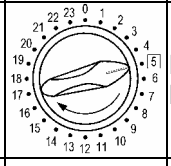
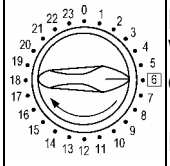
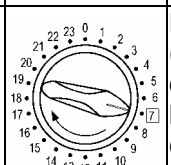
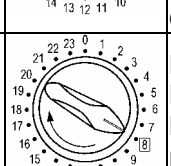
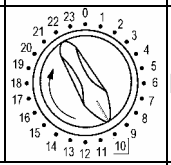
In the first position the function test of the buttons and the corresponding LEDs is performed; by rotating the programme selector **clockwise** the operation diagnostics of each component and the reading of the alarms is carried out.

10.2 Exiting diagnostics system

↳ To exit the diagnostics system switch the appliance off, on and then off again.

10.3 Phases of the diagnostics test

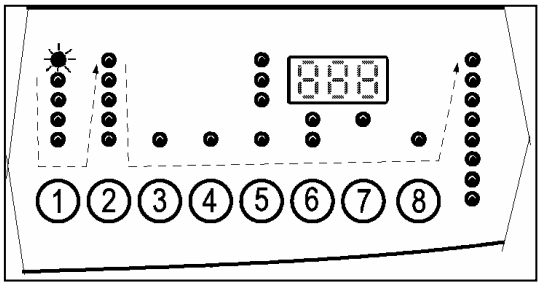
Independently of the type of selector, after activating the diagnostics system, the operation diagnostics of the different components and the reading of the alarms can be performed, by rotating the selector **clockwise**.
In models with digit the code of the selector position is displayed for a second.
In the diagnostics cycle all alarms are activated. If during the cycle operation an alarm occurs, the appliance blocks and the LEDs (and the display) flash indicating the relative code.

Diagnostics phases					
Selector position		**Components actioned**	**Operating conditions**	**Function checked**	**Displayed parameters (1)**
1		All the LEDs light in sequence. When a button is pressed, the corresponding LED lights (and the buzzer, if featured, sounds)	Always activated	Operation of the user interface	Button codification
2		Door interlock Washing solenoid	Door locked Water level below anti-flooding level Maximum time 5 minutes	Water ducted through washing compartment	(**)Selection position code
3		Door interlock Pre-wash solenoid	Door locked Water level below anti-flooding level Maximum time 5 minutes	Water ducted through pre-wash compartment (bleach)	(**)Selection position code
4		Door interlock Pre-wash and wash solenoids	Door locked Water level below anti-flooding level Maximum time 5 minutes	Water ducted through conditioner compartment	(**)Selection position code
5		Door interlock. Bleach/stains solenoid.	Door locked Water level below anti-flooding level Maximum time 5 minutes	Water ducted through bleach/stains compartment	(**)Selection position code
6		Door interlock Washing solenoid if the level of water in the tub is below 1st level Heating element.	Door locked. Water at 1st level. Maximum time 10 min. or up to 90ºC. **(*)**	Heating	(**)Selection position code
7		Door interlock. (Washing solenoid if the level of water in the tub is below 1st level). Motor (55 rpm clockwise, 55 rpm counter-clockwise, 250 rpm impulse)	Door locked Water level at 1st level.	Check for leaks from the tub	(**)Selection position code
8		Door interlock Drain pump Motor up to 650 rpm then at maximum spin speed	Door locked Water level lower than anti-boiling level for spinning	Drain and spin; control of congruence in closure of level pressure switches	(**)Selection position code
9	---	---	---	---	---
10		Reading/cancelling last alarm	---	---	Alarm code
11, 12 ...24		All LEDs light in sequence. Pressing a button the corresponding LED lights (and the Buzzer sounds, if featured)			

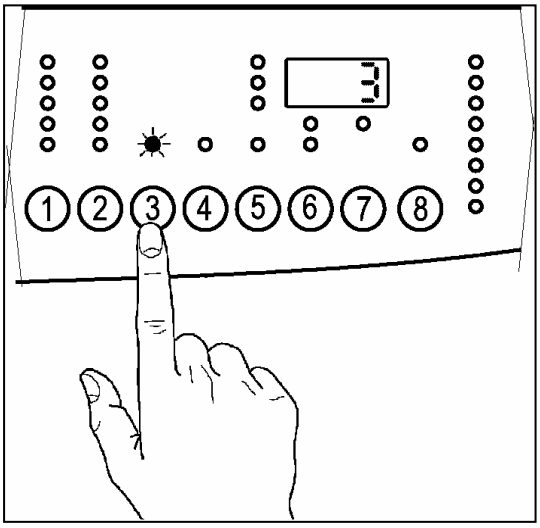
(*)In most cases, this time is sufficient to check the heating. However, the time can be increased by repeating the phase without draining the water: for a moment to a different phase of the diagnostics cycle and then back to the heating control phase (if the temperature is higher than 80°C, heating does not take place).
(**) See table page 46.
(1) Models with Display.

10.3.1 Display board diagnostics

After entering the diagnostics system, the display board is checked: all LEDs and the display light in sequence (if featured).



Pressing all buttons, the corresponding LEDs switch on or those closer; the display shows the hexadecimal code corresponding to the button codification.



10.3.2 Programme selector

In the table are indicated the closures between the contact C6 (common) and the other contacts (C1–C5) of the programme selector in the different positions and the corresponding codification. The code is displayed only in the appliances with display.

Selector position		Closure of selector contacts (C6 is the common)					Display code
Type 24 positions	Type 12 positions (C1 is not featured)	C1	C2	C3	C4	C5	
1 - Cancel	1 - Cancel	0	1	1	1	1	**1 E**
2	2	0	1	0	0	1	**0 6**
3	-	0	1	1	0	0	**1 4**
4	3	0	1	0	1	0	**0 C**
5	-	0	1	1	1	0	**1 C**
6	4	0	0	0	1	1	**0 A**
7	-	1	0	0	0	0	**0 1**
8	-	1	0	0	0	1	**0 3**
9	-	1	0	0	1	0	**0 9**
10	5	0	1	0	1	1	**0 E**
11	6	0	0	1	0	1	**1 2**
12	-	1	0	0	1	1	**0 b**
13	-	1	0	1	0	0	**1 1**
14	7	0	0	1	1	0	**1 8**
15	-	1	0	1	0	1	**1 3**
16	8	0	0	1	1	1	**1 A**
17	-	1	0	1	1	0	**1 9**
18	-	1	0	1	1	1	**1 b**
19	-	1	1	0	0	0	**0 5**
20	9	0	1	1	0	1	**1 6**
21	-	0	0	0	0	1	**0 2**
22	10	0	1	0	0	0	**0 4**
23	11	0	0	0	1	0	**0 8**
24	12	0	0	1	0	0	**1 0**

Selector position	Closure of selector contacts (C6 is the common)					Display code
Type 16 Positions (C1 is not featured)	C1	C2	C3	C4	C5	
1 - Cancel	0	1	1	1	1	**1 F**
2	0	1	0	0	1	**0 7**
3	0	1	1	0	0	**1 5**
4	0	1	0	1	0	**0 D**
5	0	0	0	1	1	**0 B**
6	0	1	0	1	1	**0 F**
7	0	0	1	0	1	**1 3**
8	0	0	1	1	0	**1 9**
9	0	0	1	1	1	**1 B**
10	0	1	1	0	1	**1 7**
11	0	1	1	1	0	**1 D**
12	0	0	0	0	0	**0 1**
13	0	1	0	0	0	**0 5**
14	0	0	0	1	0	**0 9**
15	0	0	0	0	1	**0 3**
16	0	0	1	0	0	**1 1**

11 ALARMS

11.1 Displaying the alarms to the user (for appliances with Display)

Control of the alarm system can be configured; according to the model, therefore, some or all of the alarms may be displayed to the user.

Normally all the alarms are displayed to the user except for:
E10 – Water fill difficulty
E20 – Drain difficulty
E40 – Relative to the door lock
E90 – Relative to the configuration

The alarms are active during the execution of the washing programme; except for the alarms relative to the configuration and power/frequency supply which are displayed also in the selection phase.
The door can normally be opened (except where specified) when an alarm condition has occurred on condition that:

- The level of the water in the tub is under a level which depends on the configuration of the appliance.
- The temperature of the water is lower than 55°C

Certain alarm conditions require that a drain phase be performed before the door can be opened:

- Cooling water fill if the temperature is in excess of 65°C
- Drain until the pressure switch is on empty, during a max. 5 minute time.

11.1.1 Alarms displayed during normal operation

The type of alarm condition is displayed to the user by the repeated flashing of the END OF CYCLE LED (0.4 seconds lit, 0.4 seconds off, with an interval of 2.5 seconds between sequences). This LED is featured on ALL MODELS, though configured in different positions.

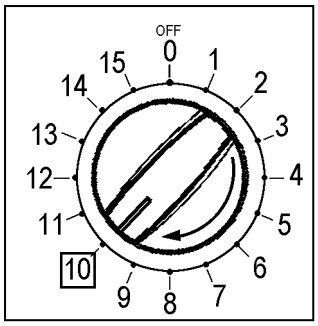
If, for example, the user should forget to close the door, the control system will detect alarm E41 about 15 seconds after the start of the cycle; the cycle remains in PAUSE mode and the display, if featured, would display E40.

Simultaneously the LED end-of-cycle flashes repeating the sequence indicated in the table.
The four flashing indicate the first of the two digits of the alarm E**4**1 (the alarms relative to a same function are grouped by families).

In this case, once the door has been closed, it is sufficient to press the start button to start the programme.

LED end of cycle →|		
On/Off	**Time (Sec.)**	**Value**
☼	0.4	1
○	0.4	
☼	0.4	2
○	0.4	
☼	0.4	3
○	0.4	
☼	0.4	**4**
○	0.4	
○	2.5	Pause between sequences

11.2 Reading the alarm codes

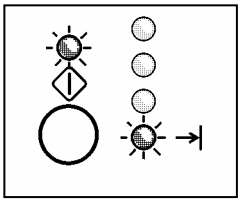


In order to read the last alarm code memorized in the EEPROM on the PCB:

- Enter diagnostics mode
- Irrespective of the type of PCB and configuration, turn the programme selector **clockwise** to the **tenth position**.

11.2.1 Displaying the alarm

The alarm is displayed by a repeated flashing sequence of the two LEDs (0.4 seconds lit, 0.4 seconds off, with an interval of 2.5 seconds between sequences).
The buzzer (if featured) will sound "bips" in synchronization with the flashing of the LEDs.



- **END OF CYCLE** LED → indicates the first digit of the alarm code (family)
- **START/PAUSE** → indicates the second digit of the alarm code (number within the family)

These two LEDs are featured on all models (though they are **configured differently**), and flash simultaneously.

Notes:

- The first letter of the alarm code "**E**" (Error) is not displayed, since this letter is common to all alarm codes.
- The alarm code "families" are shown in hexadecimal; in other words:

→ **A** is represented by 10 flashes
→ **B** is represented by 11 flashes
→ ...
→ **F** is represented by 15 flashes

- Configuration errors are shown by the flashing of a series of LEDs.

11.2.2 Examples of alarm displays

Example: Alarm E43 will display the following:

- On the display, if featured, **E43**
- The sequence of **four** flashes of the **End-of-cycle LED** indicates the first number E**4**3;
- The sequence of **three** flashes of the **Start/Pause** LED indicates the second number E4**3**;

END-OF-CYCLE LED →|			**START/PAUSE LED** ◇		
On/Off	**Time (Sec.)**	**Value**	**On/Off**	**Time (Sec.)**	**Value**
☀	0.4	1	☀	0.4	1
○	0.4		○	0.4	
☀	0.4	2	☀	0.4	2
○	0.4		○	0.4	
☀	0.4	3	☀	0.4	**3**
○	0.4		○	0.4	
☀	0.4	**4**	○	3,3	Pause
○	0.4				
○	2.5	Pause			

11.2.3 Operation of alarms during diagnostics

All alarms are enabled during the components diagnostics phase. Moving the selector to pass from one control phase to the other, the appliance exits the alarm condition and performs the selected phase (if the alarm does not occur again).

11.3 Notes about some alarms

- **Configuration alarms**

- **E91**: the error is indicated by the flashing of all LEDs, E90 is displayed on the display, if featured.
- **E92**: the error is indicated by the flashing of LEDs placed over the buttons, E90 is displayed on the display, if featured.
- **E93**: the error is indicated by the flashing of the phase/warning LEDs, E90 is displayed on the display, if featured.
- **E95**: the error is indicated by the flashing of all LEDs, E90 is displayed on the display, if featured.

- **EB1-EB2-EB3 alarms:** in case of problems with the power supply, the machine remains in alarm condition till the frequency or the power supply voltage returns to correct values or the appliance is switched off. "**EB0**" alarm family is displayed and it is not possible to enter the diagnostics or to use "alarm fast display" mode: the alarm complete can be read only when the abnormal situation terminated.

11.4 Rapid reading of alarm codes

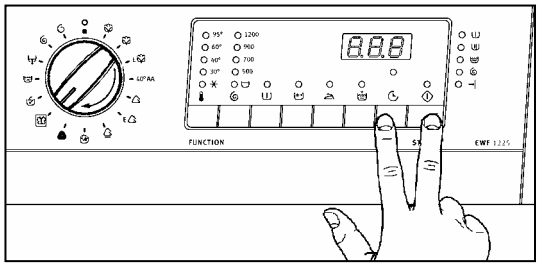
The last alarm code can be displayed even if the programme selector is not in the tenth position (diagnostics) or if the appliance is in normal operating mode (e.g. during the execution of the washing programme):

- Press and hold down **START/PAUSE** and the option button nearest to the START/PAUSE button for at least two seconds: the LEDs initially switch off, and then display the flashing sequence corresponding to the alarm or the code on the display or a message on LCD.
- The alarm sequence is displayed for the time in which the buttons are hold down
- The reading system is the same as that indicated in paragraph. 16.3
- During the time the alarm is displayed, the appliance continues to perform the cycle or, if it is in the selection phase, it keeps in memory the options previously chosen.

11.5 Cancelling the last alarm with LEDs

It is good practice to cancel the last alarm, after reading the alarm code to check whether the alarm re-occurs during the diagnostics control after the reparation of the appliance.

1. Select diagnostics mode and turn the programme selector to the **tenth** position (reading of alarm)
2. Press the **START/PAUSE** and its nearest option button simultaneously.
3. Hold down the START/PAUSE and option buttons (about 5 seconds).



11.6 Table of alarm codes

Alarm	Description	Possible fault	Action/machine status	Reset
E11	**Difficulties in water fill for washing**	Tap closed or mains pressure insufficient; drain hose incorrectly positioned; water fill solenoid faulty; leaks from the hydraulic circuit of the pressure switch; pressure switch faulty; wiring faulty; PCB faulty.	Cycle paused with door closed.	Start
E13	**Water leakage**	Drain hose incorrectly positioned; mains pressure insufficient; water fill solenoid faulty; leakage/blockage of pressure switch hydraulic circuit; pressure switch faulty.	Cycle paused with door closed.	Start
E21	**Difficulties in draining**	Drain hose kinked/blocked/incorrectly positioned; drain filter blocked/dirty; drain pump faulty; wiring faulty; PCB faulty; current leakage from heating element to ground.	Cycle paused.	Start
E23	**Drain pump triac faulty**	Drain pump faulty; wiring faulty; PCB faulty.	Safety drain cycle – Cycle stopped with door open.	OFF
E24	**Fault in "sensing" circuit of drain pump triac**	PCB faulty.	Safety drain cycle – Cycle stopped with door released.	OFF
E31	**Electronic pressure switch circuit faulty (frequency of pressure switch signal out of limits)**	Electronic pressure switch; Wiring; PCB faulty;	Cycle blocked with door closed.	OFF/reset
E32	**Incorrect calibration of electronic pressure switch (electronic pressure switch level different from 0-66 mm after initial calibration drain and anti-boiling pressure switch on "empty")**	Tap closed or mains pressure insufficient; solenoid valve; hydraulic circuit of pressure switches; Wiring; main PCB;	Cycle PAUSED.	Start
E33	**Incongruency between level of electronic pressure switch and level of anti-boiling pressure switch 1-2 (duration of fault at least 60 seconds)**	Pressure switch faulty; Energy dispersion from the heating element to earth; Heating element; Wiring faulty; PCB faulty. Hydraulic circuit;	Safety drain - Cycle blocked with door closed.	OFF/reset
E34	**Incongruency between level of electronic pressure switch and level of anti-boiling pressure switch 2 (duration of fault at least 60 seconds)**	Hydraulic circuit of pressure switches; Electronic pressure switch; Pressure switch; Wiring; PCB;	Cycle blocked with door closed.	OFF/reset
E35	**Water overflow (flooding)**	Water fill solenoid faulty; leakage from pressure switch hydraulic circuit; pressure switch faulty; wiring faulty; PCB faulty.	Cycle blocked. Safety drain cycle. Drain pump always in operation (5 minutes on, 5 minutes off etc.)	OFF/reset
E36	**Fault in "sensing" circuit of anti-boiling pressure switch**	PCB faulty.	Cycle blocked, door locked.	OFF/reset
E37	**2nd level sensing circuit faulty**	PCB faulty.	Cycle blocked, door locked.	OFF/reset
E38	**Pressure chamber blocked (water level does not vary for at least 30 sec. during drum rotation**	Pressure switch hydraulic circuit; Pressure switches; Motor drive belt broken;	Heating phase skipped.	---
E39	**"HV" sensor of anti-overflow level faulty**	PCB faulty.	Cycle blocked, door locked.	OFF/reset
E3A	**Heating elem. relay sensing faulty**	PCB faulty.	Cycle blocked, door locked	OFF/reset

Alarm	Description	Possible fault	Action/machine status	Reset
E41	**Door open**	Door interlock faulty; wiring faulty; PCB faulty.	Cycle paused	Start
E42	**Problems of door closure**	Door interlock faulty; wiring faulty; PCB faulty.	Cycle paused	Start
E43	**Interlock power supply triac faulty**	Door interlock faulty; wiring faulty; PCB faulty.	(Safety drain cycle) Cycle blocked	OFF/reset
E44	**Door interlock sensor faulty**	PCB faulty.	(Safety drain cycle) Cycle blocked	OFF/reset
E45	**Door interlock sensing circuit triac faulty**	PCB faulty	(Safety drain cycle) Cycle blocked	OFF/reset
E51	**Motor power supply triac short-circuited**	PCB faulty; current leakage from motor or from wiring.	Cycle blocked, door locked (after 5 attempts)	OFF/reset
E52	**No signal from motor tachometric generator**	Motor faulty; wiring faulty; PCB faulty	Cycle blocked, door locked (after 5 attempts)	OFF/reset
E53	**Motor triac sensing circuit faulty**	PCB faulty.	Cycle blocked, door locked	OFF/reset
E54	**Motor relay contacts sticking**	PCB faulty; current leakage from motor or from wiring	Cycle blocked, door locked (after 5 attempts)	OFF/reset
E61	**Insufficient heating during washing**	NTC sensor faulty; heating element faulty; wiring faulty; PCB faulty.	The heating phase is skipped	---
E62	**Overheating during washing**	NTC sensor faulty; heating element faulty; wiring faulty; PCB faulty.	Safety drain cycle – Cycle stopped with door open	OFF/reset
E66	**Heating element power relay faulty**	PCB faulty; current leakage from heating element to ground.	Safety drain cycle – Cycle stopped with door open	OFF/reset
E71	**Washing NTC sensor faulty**	NTC sensor faulty; wiring faulty; PCB faulty.	The heating phase is skipped	Start
E74	**Washing NTC-sensor badly positioned**	NTC sensor badly positioned; NTC sensor faulty; wiring faulty; PCB faulty.	The heating phase is skipped	Start
E82	**Error in selector reset position**	PCB faulty (Wrong configuration data). Selector, wiring	---	OFF/reset
E83	**Error in reading selector**	PCB faulty (Wrong configuration data). Selector, wiring	Cycle cancelled	---
E84	**"Sensing" circuit on circulation pump triac faulty (input signal to microprocessor always 0V or 5V)**	PCB	Drain, cycle blocked (door open)	OFF/reset
E85	**Circulation pump faulty (incongruency between status of "sensing" circuit on circulation pump and status of TRIAC)**	Circulation pump; wiring; main PCB	Drain, cycle blocked (door open)	OFF/reset
E91	**Communication incongruence between main PCB- display board (versions not compatible)**	Wiring faulty; Faulty control/display board Main PCB faulty.	Cycle interrupted	---
E92	**Communication incongruence between main PCB- display board (versions not compatible)**	Wrong control/display board; Wrong PCB (do not correspond to the model).	Cycle interrupted	---
E93	**Incorrect configuration of appliance**	Incorrect configuration data; PCB faulty.	Cycle interrupted	OFF/reset
E94	**Incorrect configuration of washing cycle**	Incorrect configuration data; PCB faulty.	Cycle interrupted	OFF/reset

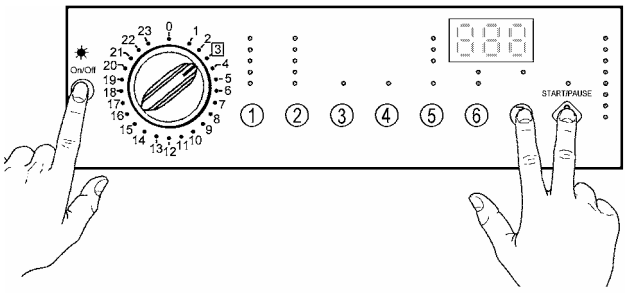
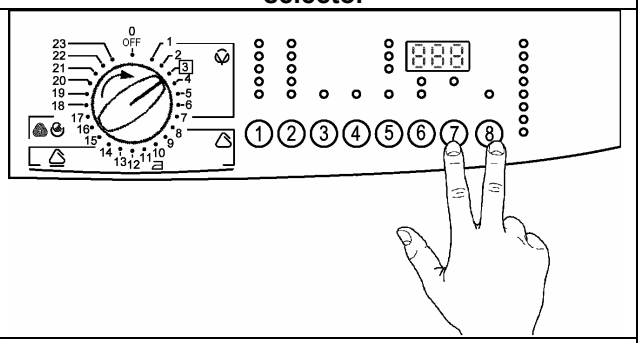
Alarm	Description	Possible fault	Action/machine status	Reset
E95	**Communication error between microprocessor and EEPROM**	PCB faulty.	Cycle interrupted	OFF/reset
E97	**Incongruence between programme selector and cycle configuration**	Faulty PCB (Wrong configuration data).	Cycle interrupted	OFF/reset
EB1	**Frequency of appliance incorrect**	Power supply problems (incorrect / disturbance); PCB faulty.	Cycle interrupted	---
EB2	**Voltage too high**	Power supply problems (incorrect / disturbance); PCB faulty.	Cycle interrupted	---
EB3	**Voltage too low**	Power supply problems (incorrect / disturbance); PCB faulty.	Cycle interrupted	---
EF1	**Drain filter blocked (too long drain phase)**	Drain tube blocked/kinked/too high; Drain filter dirty/blocked.	Warning displayed at the end of cycle (specific LED)	---
EF2	**Overdosing of detergent (too much foam during drain phases)**	Excessive detergent dosing; drain tube kinked/blocked; Drain filter dirty/blocked.	(specific LED)	---
EF3	**Control water intervention**	Water leakage on the base; faulty water control device.	Water drain and cycle blocked	OFF/reset
E00	**No alarm**	---	---	---

12 Operating time counter

It is possible to display, with a specific procedure, the operating time of the appliance, which is counted from the first switching on.
This option is available only in models with display. The maximum memorization capacity is **6550** operating hours.

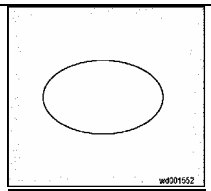
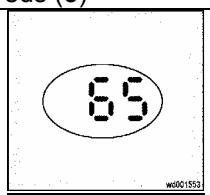
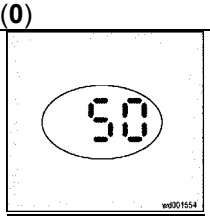
- Only the operating time of normal programmes is displayed (not diagnostics cycles)
- The actual time of the cycle performed is counted (not the pauses, the delayed start time, rinse hold and the soak phases)
- The memorization is 30 seconds for each programme
- Only operating hours are displayed (1h and 59min = 1h)

12.1.1 Operating time reading

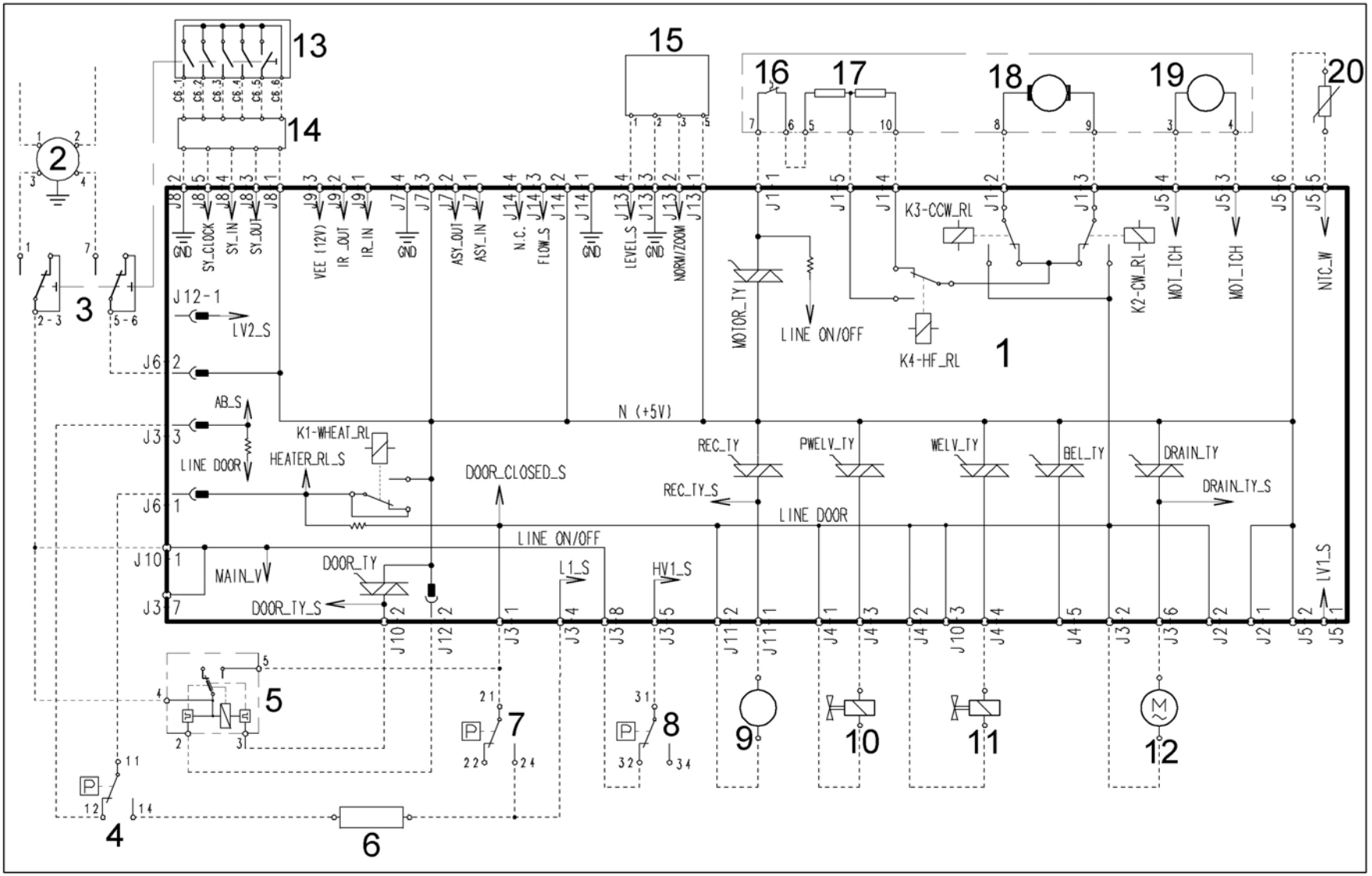
Version with ON/OFF button	Version with ON/OFF button incorporated in the selector
	
1. Reset the set programme and switch the appliance off. 2. Rotate the programme selector of **three positions clockwise.** 3. Press the **start/pause** (8) and **anyone** of the option buttons simultaneously and then, holding the buttons down, **switch the appliance on** with the ON/OFF button (on/off) 4. Keep the start/pause and option buttons down till the LEDs start flashing (about 5 seconds).	1. Cancel the set programme and switch the appliance off. 2. Press the **start/pause** (8) and **anyone** of the option buttons simultaneously and then, holding the buttons down, switch the appliance on rotating the programme selector of **three positions clockwise.** 3. Keep the start/pause and option buttons down till the LEDs start flashing (about 5 seconds).

12.1.2 Displaying the operating time

The operating time is displayed two digits at a time: the first pair of digits shows the thousands and hundreds; the second pair shows tens and units.
For example, a total operating time of **6,550** hours will be displayed as follows:

1 →	2 →	3 →
Blank display for two seconds	The first pair of digits is displayed for two seconds: - thousands (**6**) - hundreds (**5**)	The second pair of two digits is displayed for two seconds: - tens (**5**) - units (**0**)
		

13 BASIC CIRCUIT DIAGRAM WITH DISPLAY



13.1 Key to circuit diagram

Components of the appliance	Components of the PCB	
1. Electronic board		
2. Suppressor	BEL_TY	Bleach solenoid Triac
3. ON/OFF switch (*incorporated in the selector)*	DOOR_TY	Door interlock Triac
4. AE1 Anti-boiling pressure switch	DRAIN_TY	Drain pump Triac
5. Door interlock	REC_TY	Recirculation pump Triac
6. Heating element	K1	Heating element relay
7. AE2 Anti-boiling pressure switch	K2	Motor relay: clockwise rotation
8. Anti-overflow pressure switch	K3	Motor relay: anti-clockwise rotation
9. Recirculation pump	K4	Motor relay: half field power supply *(models with higher spin than 1200 rpm)*
10. Pre-wash solenoid valve		
11. Wash solenoid valve	MOTOR_TY	Motor Triac
12. Drain pump	PWELW_TY	Pre-wash solenoid Triac
13. Selector	WELV_TY	Wash solenoid Triac
14. Control/display board		
15. Analogic pressure switch		
16. Thermal cut-out (motor)		
17. Stator (motor)		
18. Rotor (motor)		
19. Tachometric generator (motor)		
20. NTC temperature sensor		